

APPENDIX G

MW-5S and MW-24S Statistical Analysis

Table 1: Summary of Sample Concentration Data for MW-5S

Sample Date	Sample ID	Analyte Concentration (ug/L)					
		1,1-DCE	PCE	1,1,1-TCA	TCE	cis-1,2-DCE	1,4-Dioxane
4/1/2004		200	92	300	2900	2000	160
7/1/2004		130	160	170	1500	1200	86
11/1/2004		120	110	140	1300	1200	85
4/1/2005		400	120	630	5900	4100	290
7/1/2005		630	78	1000	9300	6900	400
11/1/2005		110	78	150	1500	1100	76
7/1/2006		960	190	1300	14000	11000	660
11/1/2006		810	130	1200	12000	11000	580
7/1/2007		170	160	180	2100	1400	110
Nov. 2007		90	140	610	6000	6200	260
7/30/2008		29	26	32	370	270	19
3/30/2010		200	200	200	1700	1500	76
3/30/2011		310	200	260	4200	3700	182
4/18/2012	MW-5S_041812	330	71	380	4900	3600	210
4/3/2013	MW-5S-040313	560	88	670	8600	7300	330
6/4/2013	MW-5S-060413	530	82	680	8500	7100	300
10/9/2013	MW-5S-100913	550	59	650	8200	6000	290
1/8/2014	MW-5S_1814	520	46	540	7200	6300	280
5/1/2014	MW-5S_05214	700	67	930	9200	7700	470

Table 2: Summary of Sample Concentration Data for MW-24S

Sample Date	Sample ID	Analyte Concentration (ug/L)					
		1,1-DCE	PCE	1,1,1-TCA	TCE	cis-1,2-DCE	1,4-Dioxane
7/1/2006		2	7	3	40	27	2
11/1/2006		2	5	3	34	24	2
7/1/2007		5	8	6	58	61	3
Nov-2007		0.3	0.8	0.4	6	3	1
7/30/2008		2	3	2	21	17	1
3/30/2010		2	2.1	2	19	23	1
3/30/2011		5	5	5	30	46	2.1
4/18/2012	MW-24S_041812	9	7.3	9.9	74	140	3.7
4/3/2013	MW-24S_040313	4.1	7.7	4.1	27	17	1.7
6/4/2013	MW-24S_060413	4.2	8	4.8	61	41	2.7
10/9/2013	MW-24S_100913	3.2	4.4	3.3	38	33	1.9
1/8/2014	MW-24S_1814	2.5	5.6	2.4	5.6	24	1.6
5/1/2014	MW-24S-050114	2.4	5.3	2.7	11	9.9	1.3

Table 3: Summary Statistics for MW-5S Data Set

Parameter	1,1-DCE	PCE	1,1,1-TCA	TCE	cis-1,2-DCE	1,4-Dioxane
Sample Size (n)	19	19	19	19	19	19
Minimum Concentration (ug/L)	29	26	32	370	270	19
Maximum Concentration (ug/L)	960	190	1300	14000	11000	660
Mean Concentraion (ug/L)	397	100	546	5756	4714	256
Median Concentration (ug/L)	365	88	575	5900	4100	260
Standard Deviation	274	45	379	3954	3336	177
Coefficient of Variation (CV)	0.691	0.447	0.694	0.687	0.708	0.69
Skewness Coefficient	0.442	0.445	0.558	0.41	0.435	0.831
Standard Error of Skewness	0.56	0.56	0.56	0.56	0.56	0.56
2* Standard Error of Skewness	1.1	1.1	1.1	1.1	1.1	1.1
Distribution	Normal	Normal	Normal	Normal	Normal	Normal
Shapiro Wilk Test Statistic	0.939	0.966	0.932	0.939	0.914	0.927
5% Shapiro Wilk Critical Value	0.897	0.892	0.897	0.901	0.901	0.901

Table 4 : Summary Statistics for MW-24S Data Set

Parameter	1,1-DCE	PCE	1,1,1-TCA	TCE	cis-1,2-DCE	1,4-Dioxane
Sample Size (n)	13	13	13	13	13	13
Minimum Concentration (ug/L)	0.3	0.8	0.4	5.6	3	1
Maximum Concentration (ug/L)	9	8	9.9	74	140	3.7
Mean Concentraion (ug/L)	3.336	5.564	3.782	32.66	35.84	2.091
Median Concentration (ug/L)	2.5	5.6	3	30	24	2
Standard Deviation	2.288	2.407	2.503	21.43	34.89	0.778
Coefficient of Variation (CV)	0.686	0.433	0.662	0.656	0.973	0.372
Skewness Coefficient	1.539	-0.916	1.495	0.57	2.493	0.822
Standard Error of Skewness	0.68	0.68	0.68	0.68	0.68	0.68
2* Standard Error of Skewness	1.36	1.36	1.36	1.36	1.36	1.36
Distribution	Normal	Normal	Normal	Normal	Not Normal	Normal
Shapiro Wilk Test Statistic	0.863	0.89	0.877	0.943	0.723	0.943
5% Shapiro Wilk Critical Value	0.85	0.85	0.85	0.866	0.866	0.85

Table 5: Summary of Outlier Test Results for MW-5S

Parameter	1,1-DCE	PCE	1,1,1-TCA	TCE	cis-1,2-DCE	1,4-Dioxane
Sample Size (n)	19	19	19	19	19	19
Mean Concentraion (ug/L)	397	100	546	5756	4714	256
Potential Outliers ^{1,2}	960; 29*	190; 26*	1300; 32*	14000, 370*	11000, 270*	660; 19*
Dixon Outlier Test Statistic	0.302; 0.106	0.229; 0.246	0.259; 0.112	0.376; 0.127	0.337; 0.125	0.325; 0.126
Dixon Critical Value for $\alpha = 0.05$	0.462	0.462	0.462	0.462	0.462	0.462
Conclusion ³	No outliers					

1. Maximum detected concentrations initially considered as potential outliers.
2. *Indicates potential outliers identified from performing Dixon outlier only.
3. If Dixon outlier test statistic is greater than the critical value at 5% significance level, the sample data is considered to be an outlier.
4. DL/2 approach used for non-detects.

Table 6: Summary of Outlier Test Results for MW-24S

Parameter	1,1-DCE	PCE	1,1,1-TCA	TCE	cis-1,2-DCE	1,4-Dioxane
Sample Size (n)	13	13	13	13	13	13
Mean Concentration (ug/L)	3.336	5.564	3.782	32.66	35.84	2.091
Potential Outliers ^{1,2}	9; 0.3*	8; 0.8*	9.9; 0.4*	74; 5.6*	140; 3*	3.7; 0.5*
Dixon Outlier Test Statistic	0.600; 0.362	0.046; 0.181	0.573; 0.286	0.235; 0.097	0.723; 0.241	0.313; 0.200
Dixon Critical Value for $\alpha = 0.05$	0.521	0.521	0.521	0.521	0.521	0.521
Conclusion ³	9 is an outlier	No Outliers	9.9 is an outlier	No Outliers	140 is an outlier	No Outliers

1. Maximum detected concentrations initially considered as potential outliers.
2. *Indicates potential outliers identified from performing Dixon outlier only.
3. If Dixon outlier test statistic is greater than the critical value at 5% significance level, the sample data is considered to be an outlier.
4. DL/2 approach used for non-detects.

Table 7: Summary Statistics for MW-24S Data Set with Outliers Removed

Parameter	1,1-DCE	PCE	1,1,1-TCA	TCE	cis-1,2-DCE	1,4-Dioxane
Sample Size (n)	12	13	12	13	12	13
Minimum Concentration (ug/L)	0.3	0.8	0.4	5.6	3	1
Maximum Concentration (ug/L)	5	8	6	74	61	3.7
Mean Concentraion (ug/L)	2.77	5.6	3.17	32.7	27.16	2.1
Median Concentration (ug/L)	2.45	5.6	3	30	24	2
Standard Deviation	1.377	2.4	1.544	21.4	16.1	0.8
Coefficient of Variation (CV)	0.497	0.43	0.487	0.66	0.593	0.37
Skewness Coefficient	-0.00337	-0.92	0.165	0.57	0.701	0.82
Standard Error of Skewness	0.71	0.68	0.71	0.68	0.68	0.68
2* Standard Error of Skewness	1.4	1.4	1.4	1.4	1.4	1.4
Distribution	Normal	Normal	Normal	Normal	Normal	Normal
Shapiro Wilk Test Statistic	0.948	0.89	0.974	0.94	0.959	0.94
5% Shapiro Wilk Critical Value	0.842	0.85	0.842	0.87	0.859	0.85

Table 8: Summary of Upper Confidence Limit (UCL) Evaluation

Well ID	Analyte	Sample Size	Maximum Concentration	95% UCL ¹	MCL ²	Conclusion ³
MW-5S	1,1-DCE	19	960	491.6 ⁴	7	Above MCL
	PCE	19	190	118.6 ⁴	5	Above MCL
	1,1,1-TCA	19	1300	675.5 ⁴	200	Above MCL
	TCE	19	14000	7329 ⁵	5	Above MCL
	cis-1,2-DCE	19	11000	6041 ⁵	70	Above MCL
	1,4-Dioxane	19	660	326.3 ⁵	6.1 ⁶	Above MCL
MW-24S	1,1-DCE	12	5	3.334	7	In Compliance
	PCE	13	8	6.334 ⁴	5	Above MCL
	1,1,1-TCA	12	6	3.789 ⁴	200	In Compliance
	TCE	13	74	43.26 ⁵	5	Above MCL
	cis-1,2-DCE	12	61	35.5 ⁵	70	In Compliance
	1,4-Dioxane	13	3.7	2.331 ⁴	6.1 ⁶	In Compliance

1. Parametric or non-parametric estimates of the 95% UCL were based on the results of the normality test results, presented in Tables 3 and 7.

2. MCL = Maximum Contamination Level.

3. If the UCL of the concentration data set is less than MCL for the respective analyte, the concentration values are considered to be in compliance with the standards set forth for the particular analyte, and further action for monitoring and/or cleanup is not required.

4. 95% KM (t) UCL

5. 95% Student's-t UCL

6. USEPA Tapwater Risk-Based Screening Level.

Table 9: Mann-Kendall Trend Test Criteria

Score (S)	p-value (for $\alpha=0.05$)	Coefficient of Variation (CV)	Conclusion
$S < 0$	$p \leq 0.05$	–	Decreasing
$S < 0$	$0.05 < p \leq 0.1$	–	Probably Decreasing
–	$p > 0.1$	$CV < 1$	Stable
–	$p > 0.1$	$CV > 1$	No Trend
$S > 0$	$0.05 < p \leq 0.1$	–	Probably Increasing
$S > 0$	$p \leq 0.05$	–	Increasing

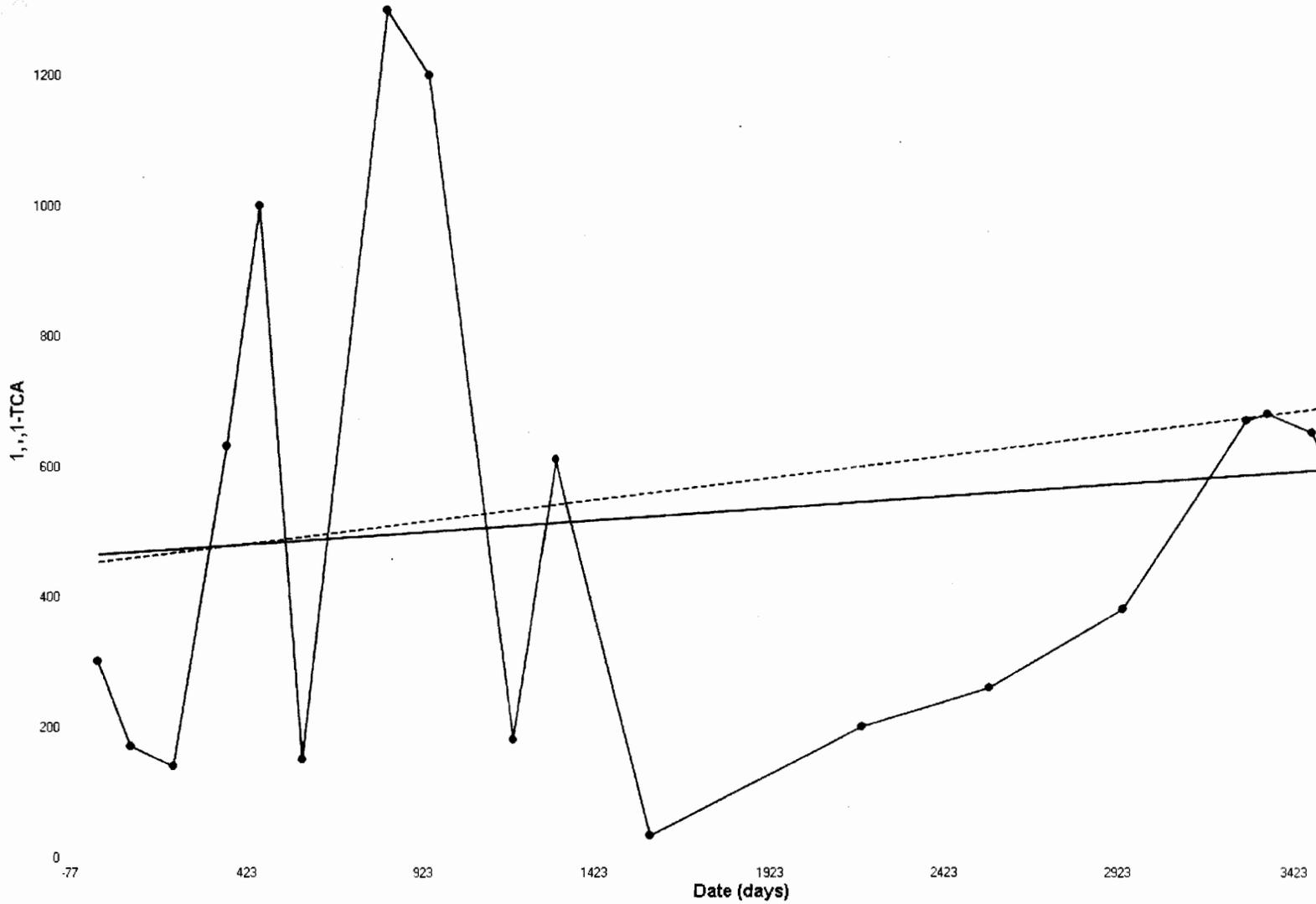
Table 10: Summary of Mann-Kendall Trend Analysis Results for MW-5S

Analyte	S	p-value (for $\alpha=0.05$)	CV	Conclusion
1,1-DCE	42	0.072	0.691	Probably Increasing
PCE	-42	0.072	0.447	Probably Decreasing
1,1,1-TCA	39	0.093	0.694	Probably Increasing
TCE	44	0.062	0.687	Probably Increasing
cis-1,2-DCE	49	0.047	0.708	Increasing
1,4-Dioxane	33	0.133	0.69	Stable

Table 11: Summary of Mann-Kendall Trend Analysis Results for MW-24S

Analyte	S	p-value (for $\alpha=0.05$)	CV	Conclusion
1,1-DCE	11	0.273	0.69	Stable
PCE	10	0.295	0.43	Stable
1,1,1-TCA	0	0.527	0.66	Stable
TCE	-12	0.255	0.66	Stable
cis-1,2-DCE	-8	0.319	0.97	Stable
1,4-Dioxane	-6	0.383	0.37	Stable

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	29.5832
Standardized Value of S	1.3295
Test Value (S)	39
Tabulated p-value	0.0930
Approximate p-value	0.0918

OLS Regression Line (Blue)

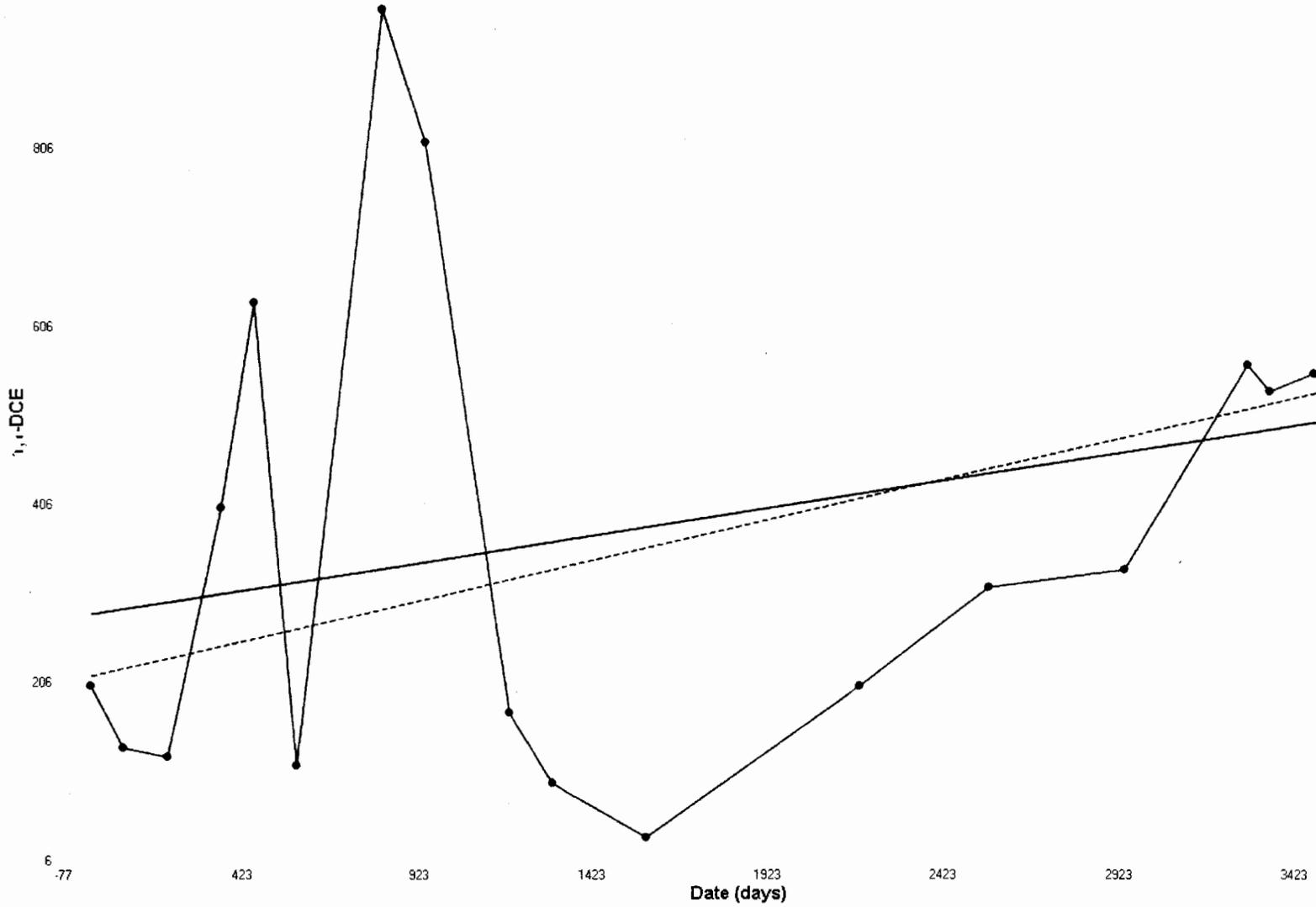
OLS Regression Slope	0.0371
OLS Regression Intercept	463.6939

Theil-Sen Trend Line (Red)

Theil-Sen Slope	0.0672
Theil-Sen Intercept	451.9753

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5657
Standardized Value of S	1.4353
Test Value (S)	42
Tabulated p-value	0.0720
Approximate p-value	0.0756

OLS Regression Line (Blue)

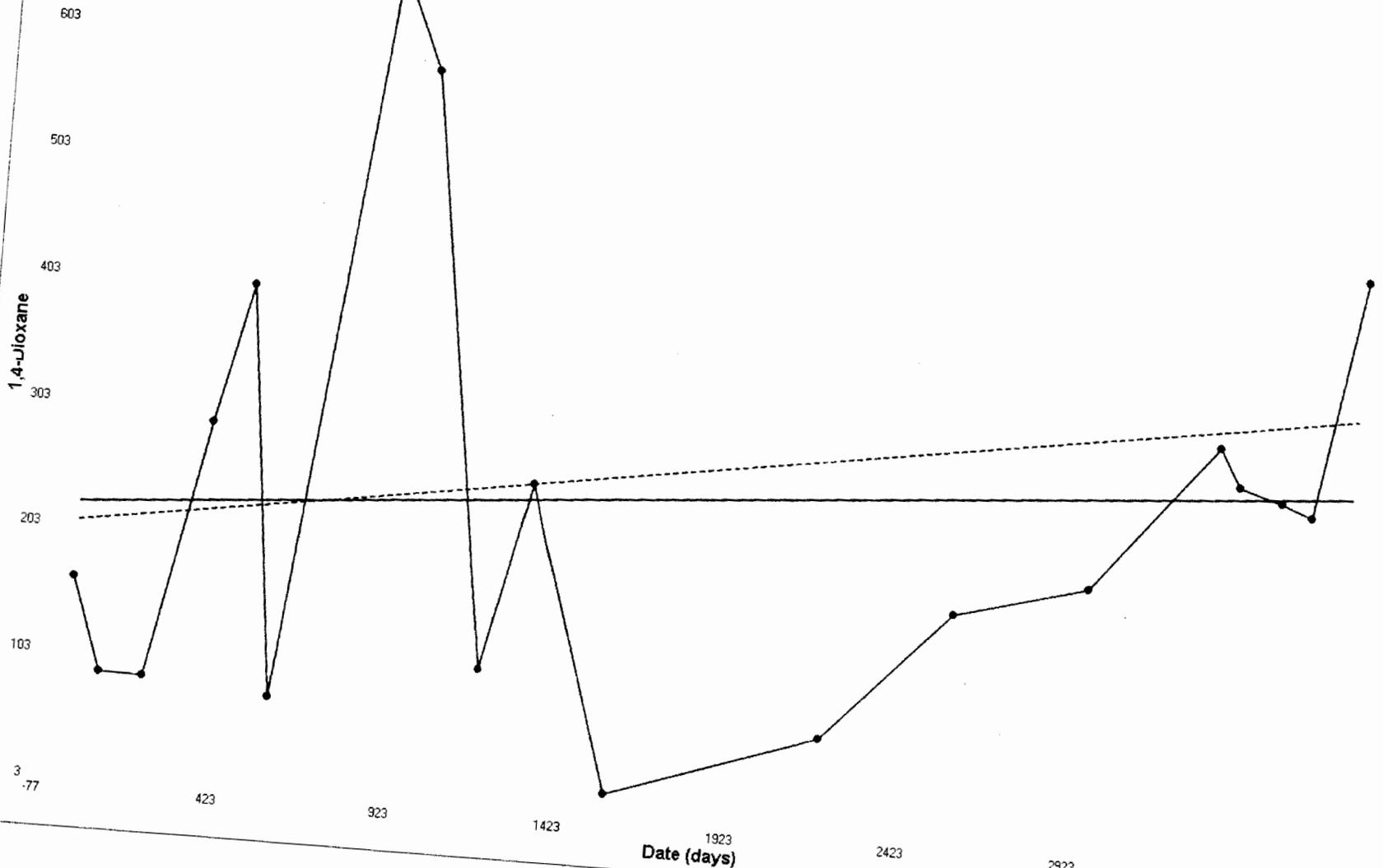
OLS Regression Slope	0.0620
OLS Regression Intercept	280.4096

Theil-Sen Trend Line (Red)

Theil-Sen Slope	0.0913
Theil-Sen Intercept	210.5248

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5482
Standardized Value of S	1.1209
Test Value (S)	33
Tabulated p-value	0.1330
Approximate p-value	0.1312

OLS Regression Line (Blue)

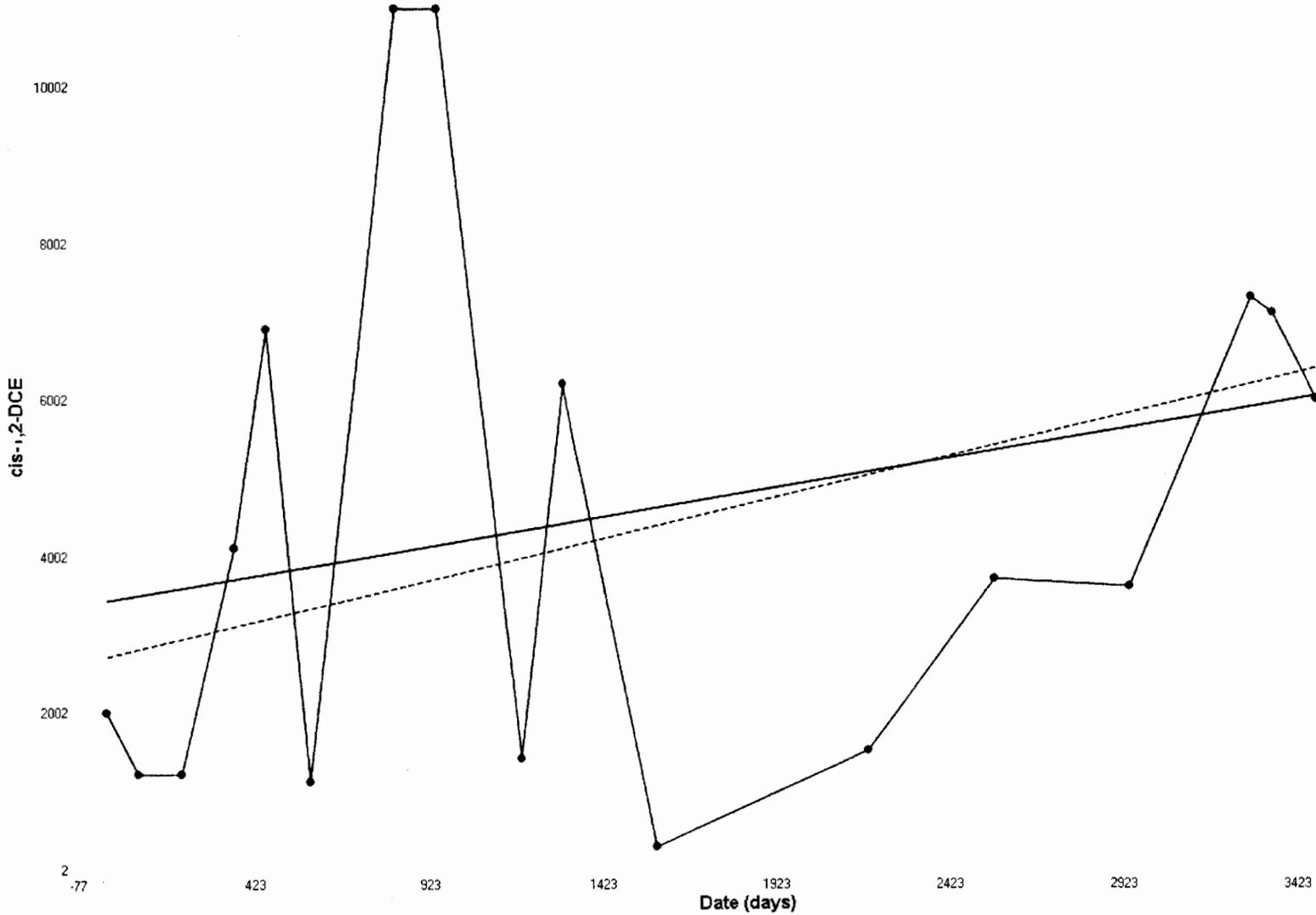
OLS Regression Slope	0.0210
OLS Regression Intercept	219.9091

Theil-Sen Trend Line (Red)

Theil-Sen Slope	0.0418
Theil-Sen Intercept	205.3118

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5482
Standardized Value of S	1.6814
Test Value (S)	49
Tabulated p-value	0.0470
Approximate p-value	0.0463

OLS Regression Line (Blue)

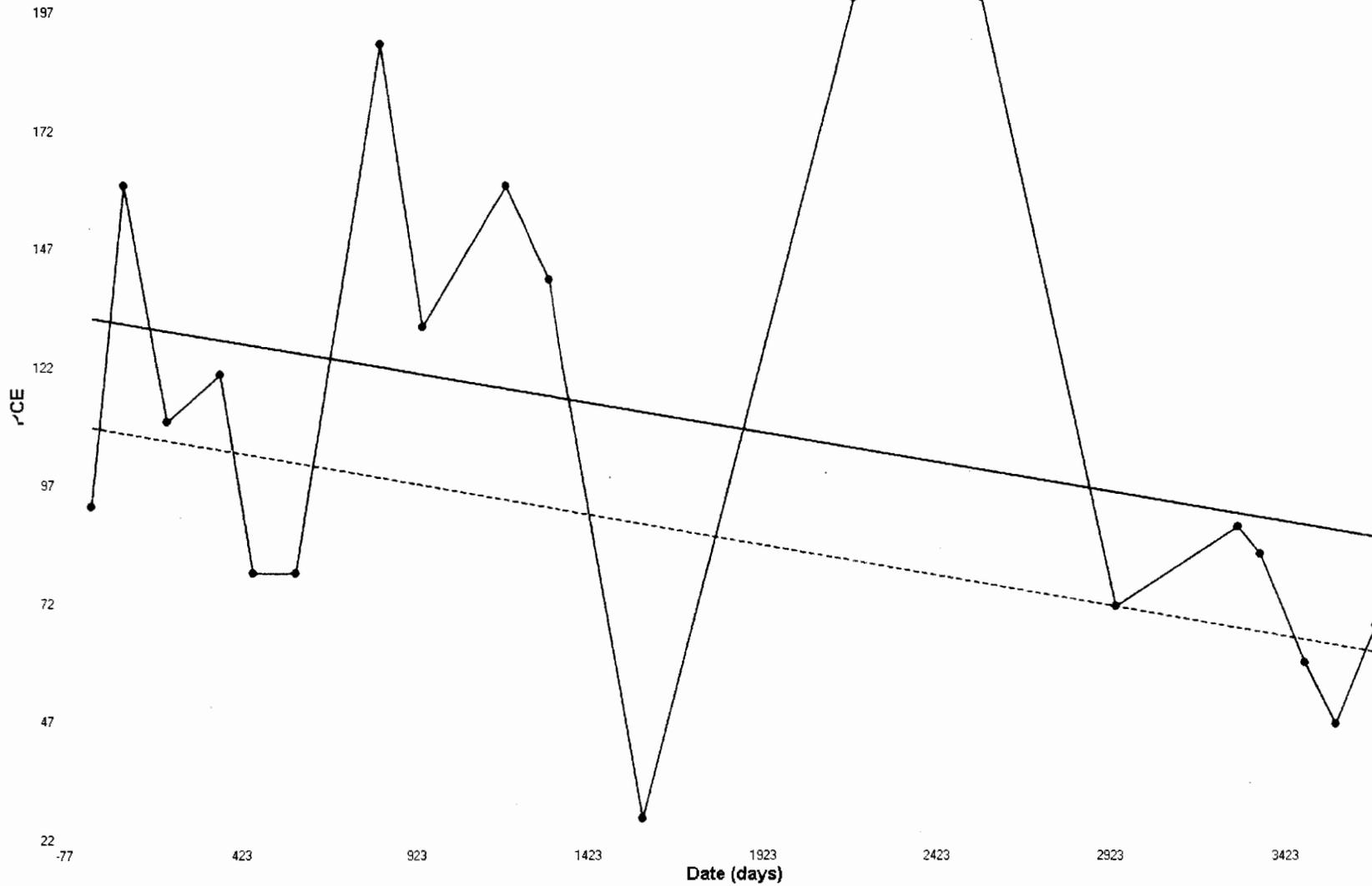
OLS Regression Slope	0.7540
OLS Regression Intercept	3,420.6853

Theil-Sen Trend Line (Red)

Theil-Sen Slope	1.0593
Theil-Sen Intercept	2,713.3475

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5307
Standardized Value of S	-1.4370
Test Value (S)	-42
Tabulated p-value	0.0720
Approximate p-value	0.0754

OLS Regression Line (Blue)

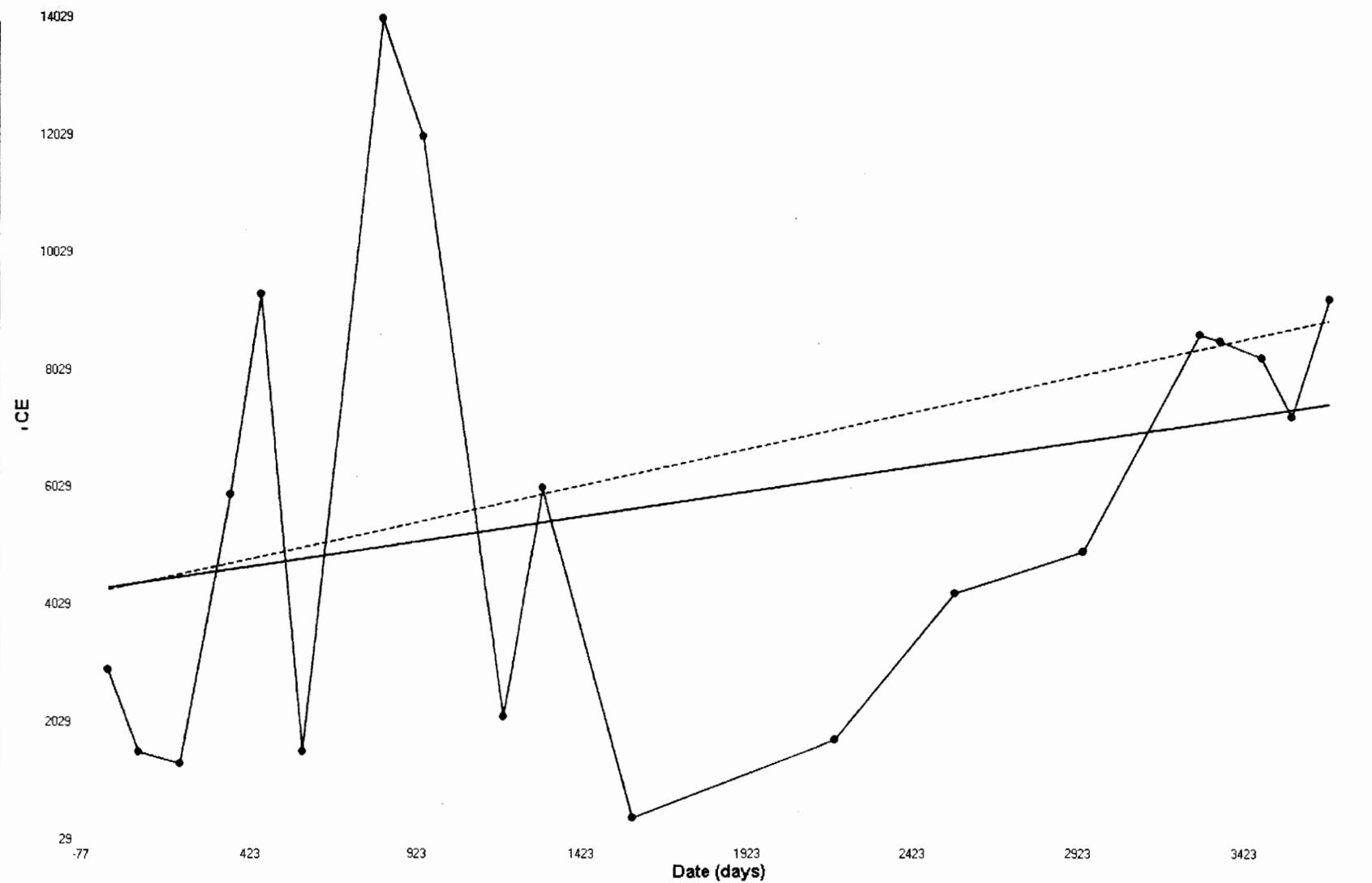
OLS Regression Slope	-0.0125
OLS Regression Intercept	131.8082

Theil-Sen Trend Line (Red)

Theil-Sen Slope	-0.0129
Theil-Sen Intercept	108.8714

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5657
Standardized Value of S	1.5053
Test Value (S)	44
Tabulated p-value	0.0620
Approximate p-value	0.0661

OLS Regression Line (Blue)

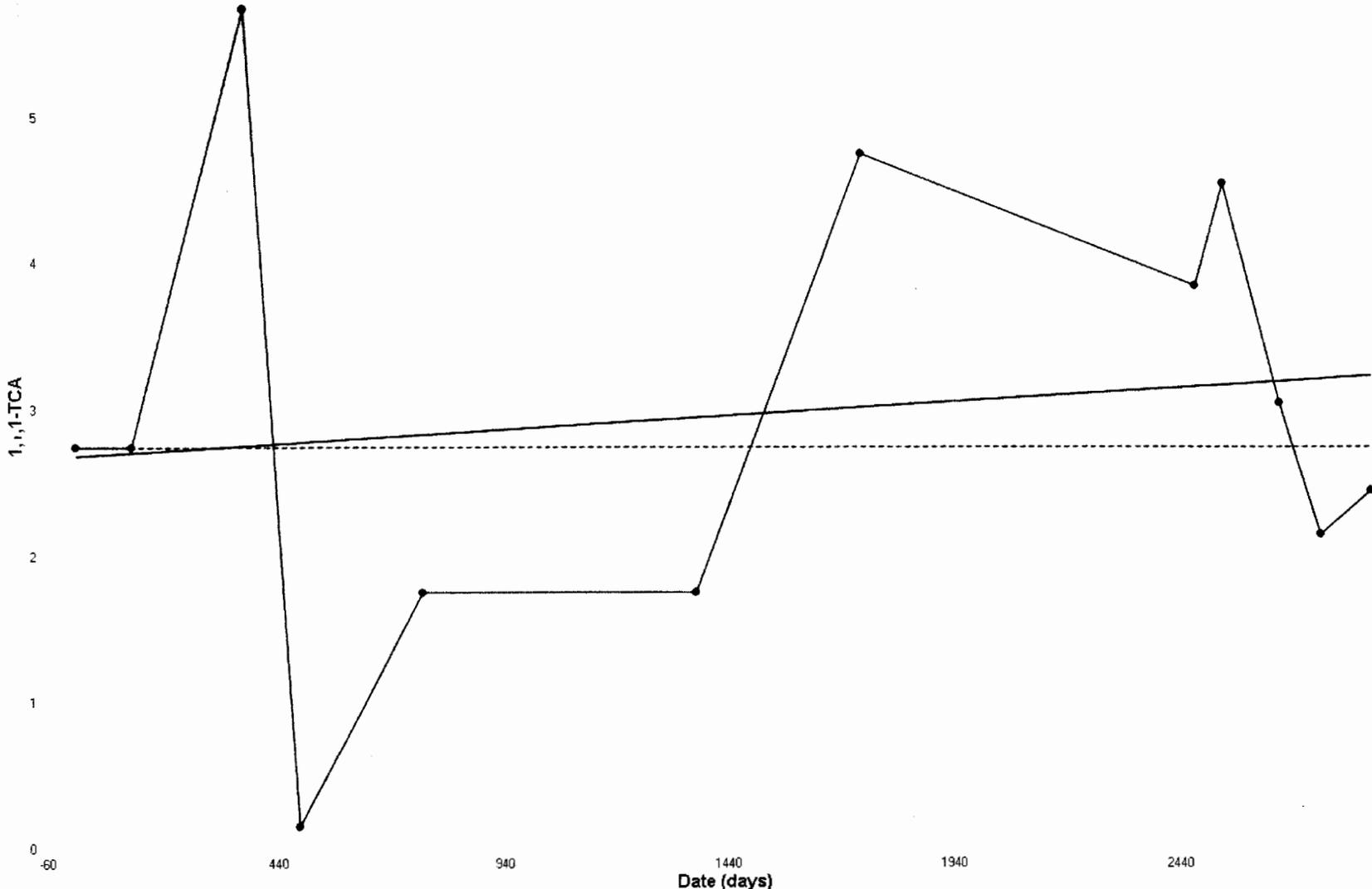
OLS Regression Slope	0.8492
OLS Regression Intercept	4,299.3408

Theil-Sen Trend Line (Red)

Theil-Sen Slope	1.2393
Theil-Sen Intercept	4,277.7350

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standardized Value of S	14.5144
Test Value (S)	0
Tabulated p-value	0.5270
Approximate p-value	

OLS Regression Line (Blue)

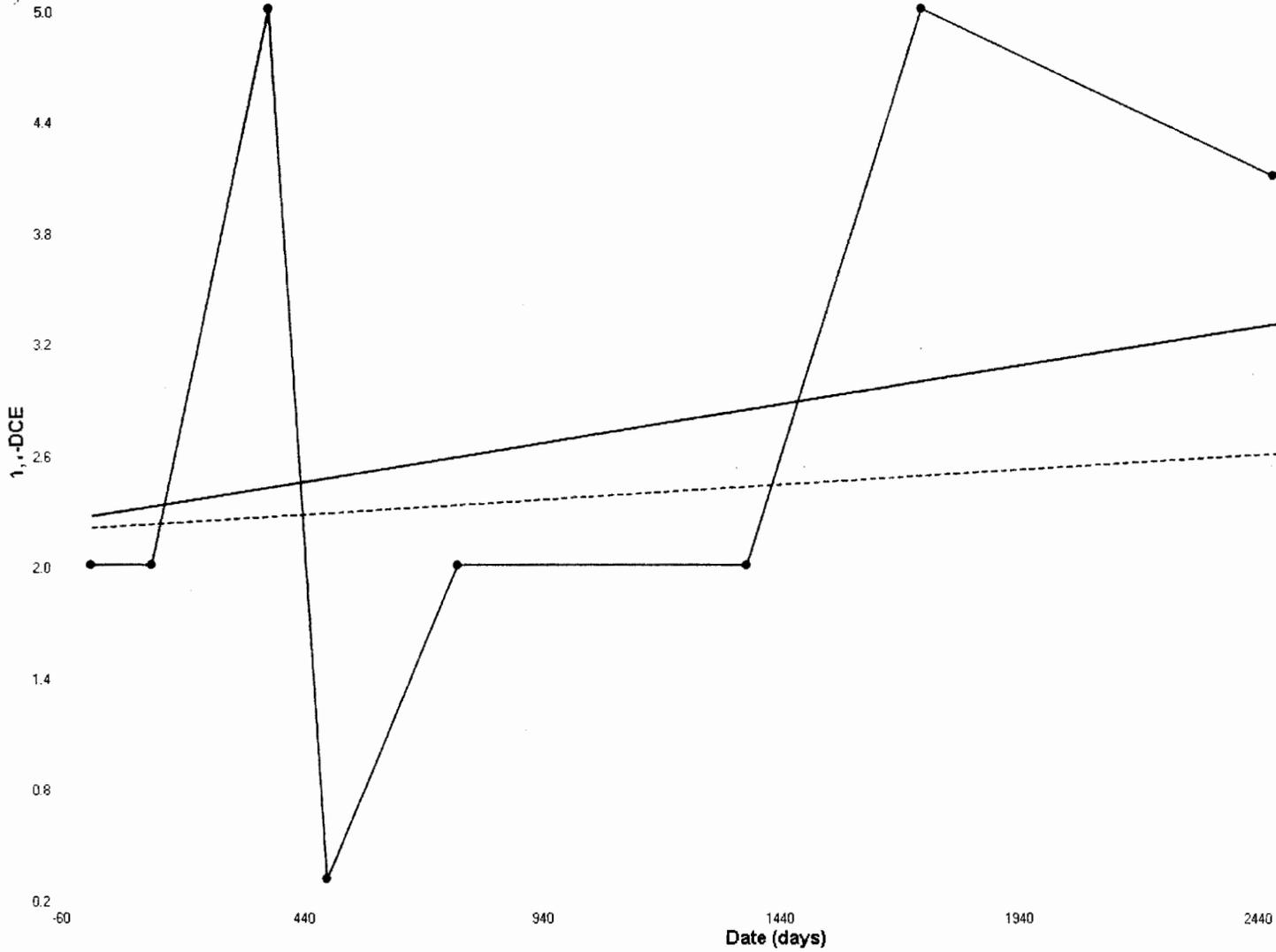
OLS Regression Slope	0.0002
OLS Regression Intercept	2.9358

Theil-Sen Trend Line (Red)

Theil-Sen Slope	0.0000
Theil-Sen Intercept	3.0000

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.2478
Standardized Value of S	0.7019
Test Value (S)	11
Tabulated p-value	0.2730
Approximate p-value	0.2414

OLS Regression Line (Blue)

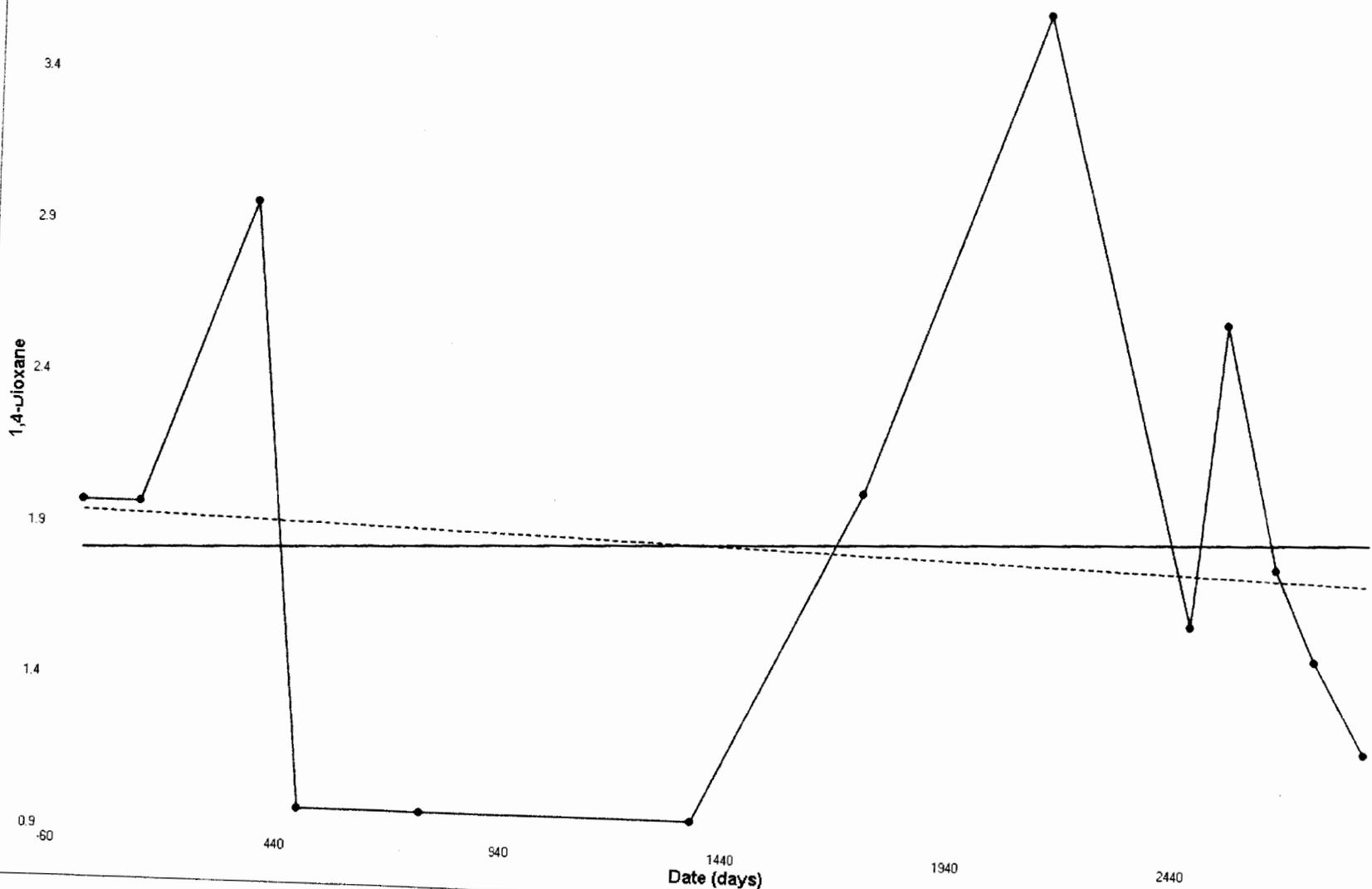
OLS Regression Slope	0.0004
OLS Regression Intercept	2.2610

Theil-Sen Trend Line (Red)

Theil-Sen Slope	0.0002
Theil-Sen Intercept	2.1957

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	13
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	16.2481
Standardized Value of S	-0.3077
Test Value (S)	-6
Tabulated p-value	0.3830
Approximate p-value	0.3791

OLS Regression Line (Blue)

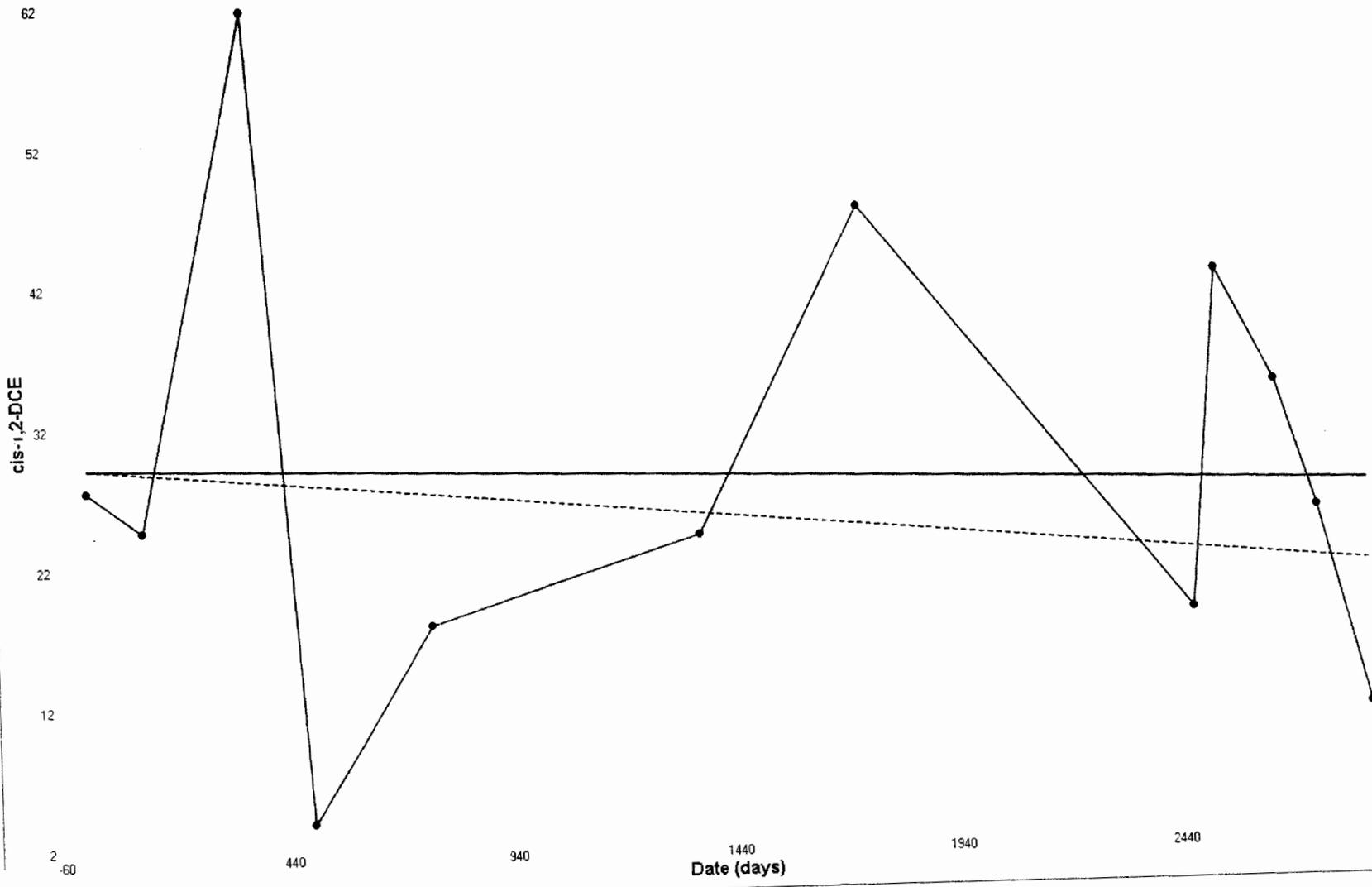
OLS Regression Slope	0.0001
OLS Regression Intercept	1.8417

Theil-Sen Trend Line (Red)

Theil-Sen Slope	0.0000
Theil-Sen Intercept	1.9668

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5144
Standardized Value of S	-0.4823
Test Value (S)	-8
Tabulated p-value	0.3190
Approximate p-value	0.3148

OLS Regression Line (Blue)

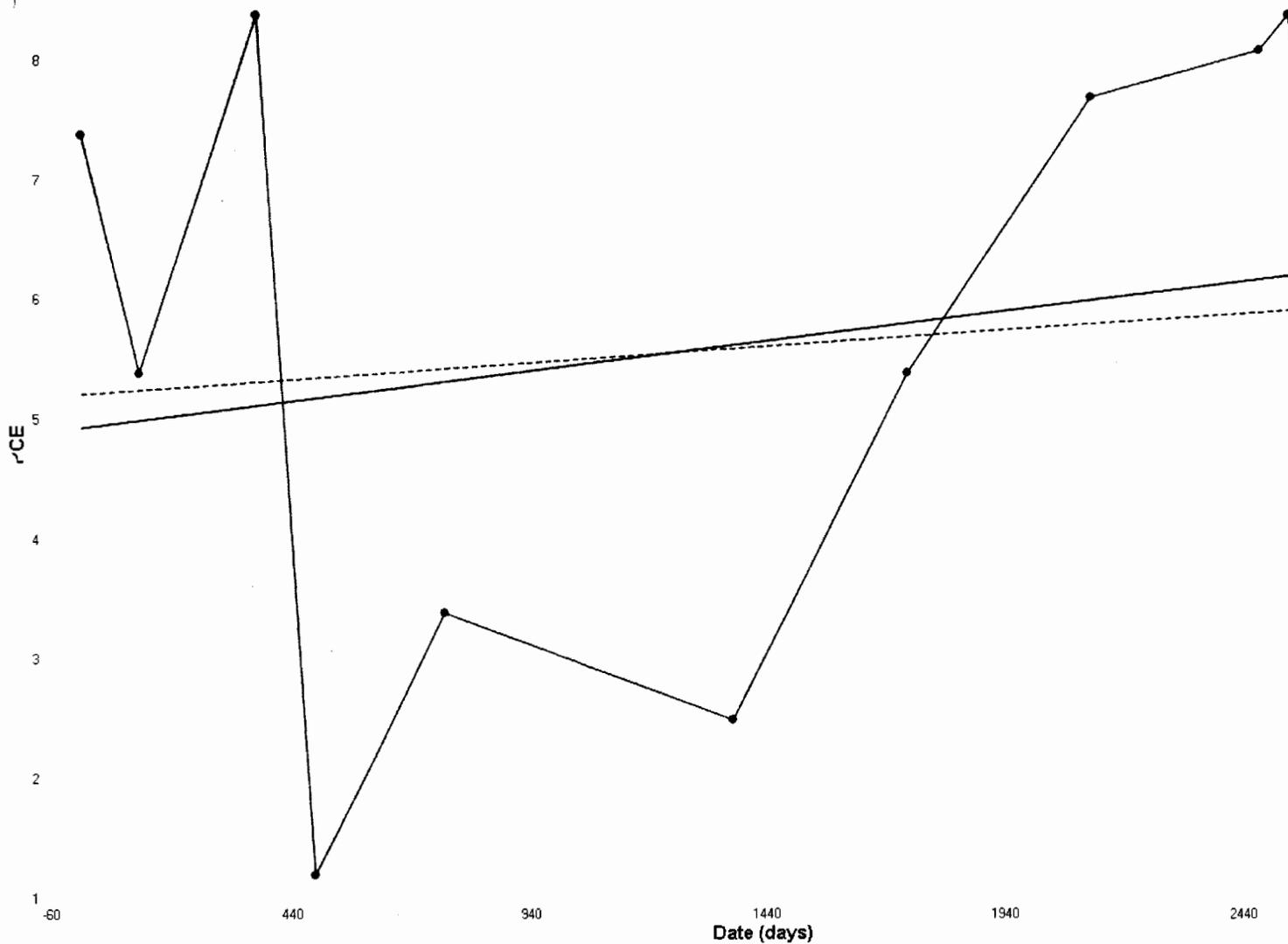
OLS Regression Slope	-0.0010
OLS Regression Intercept	28.5951

Theil-Sen Trend Line (Red)

Theil-Sen Slope	-0.0030
Theil-Sen Intercept	28.5810

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	13
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	16.3299
Standardized Value of S	0.5511
Test Value (S)	10
Tabulated p-value	0.2950
Approximate p-value	0.2908

OLS Regression Line (Blue)

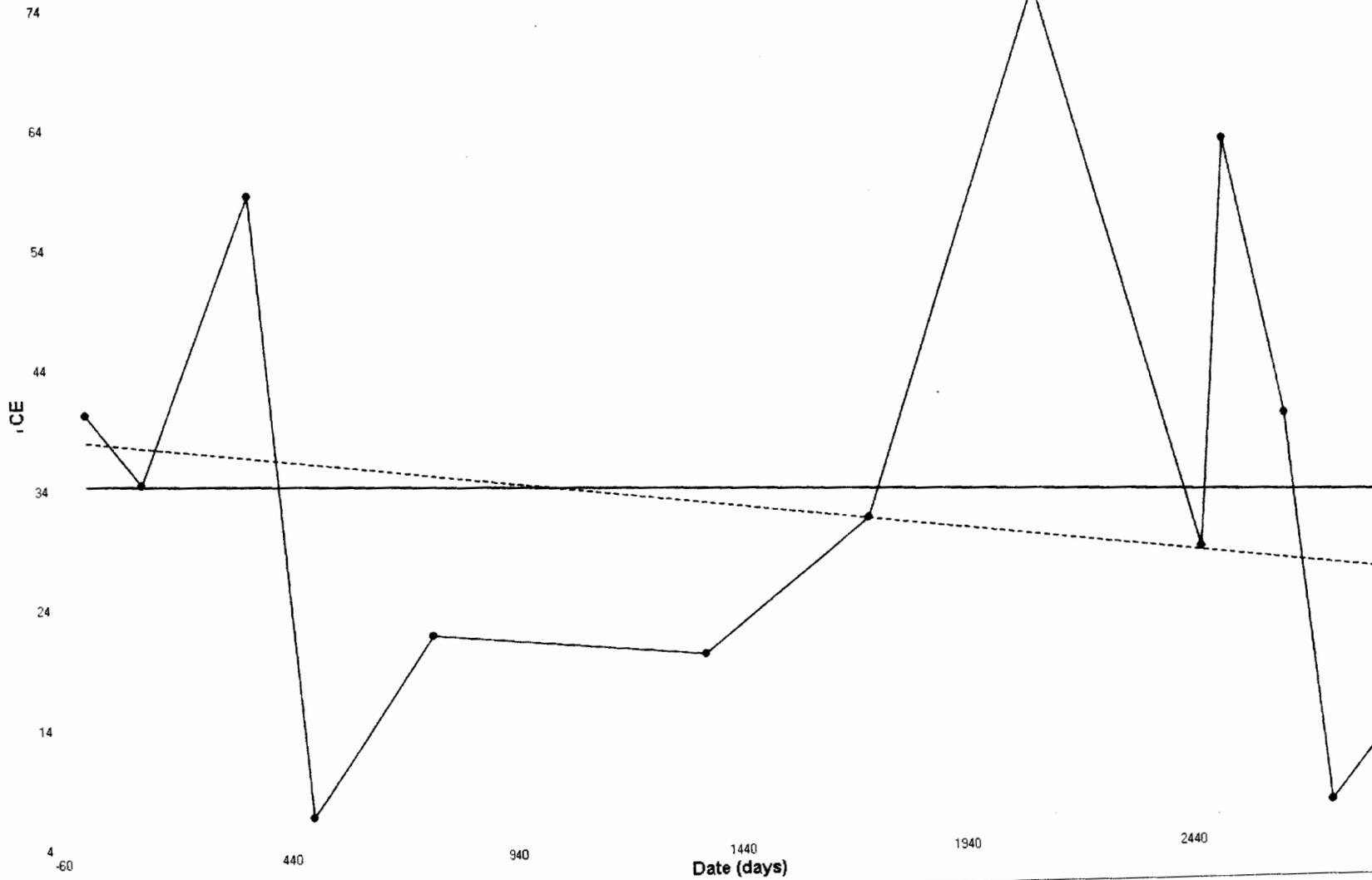
OLS Regression Slope	0.0005
OLS Regression Intercept	4.5476

Theil-Sen Trend Line (Red)

Theil-Sen Slope	0.0003
Theil-Sen Intercept	4.8238

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	13
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	16.3911
Standardized Value of S	-0.6711
Test Value (S)	-12
Tabulated p-value	0.2550
Approximate p-value	0.2511

OLS Regression Line (Blue)

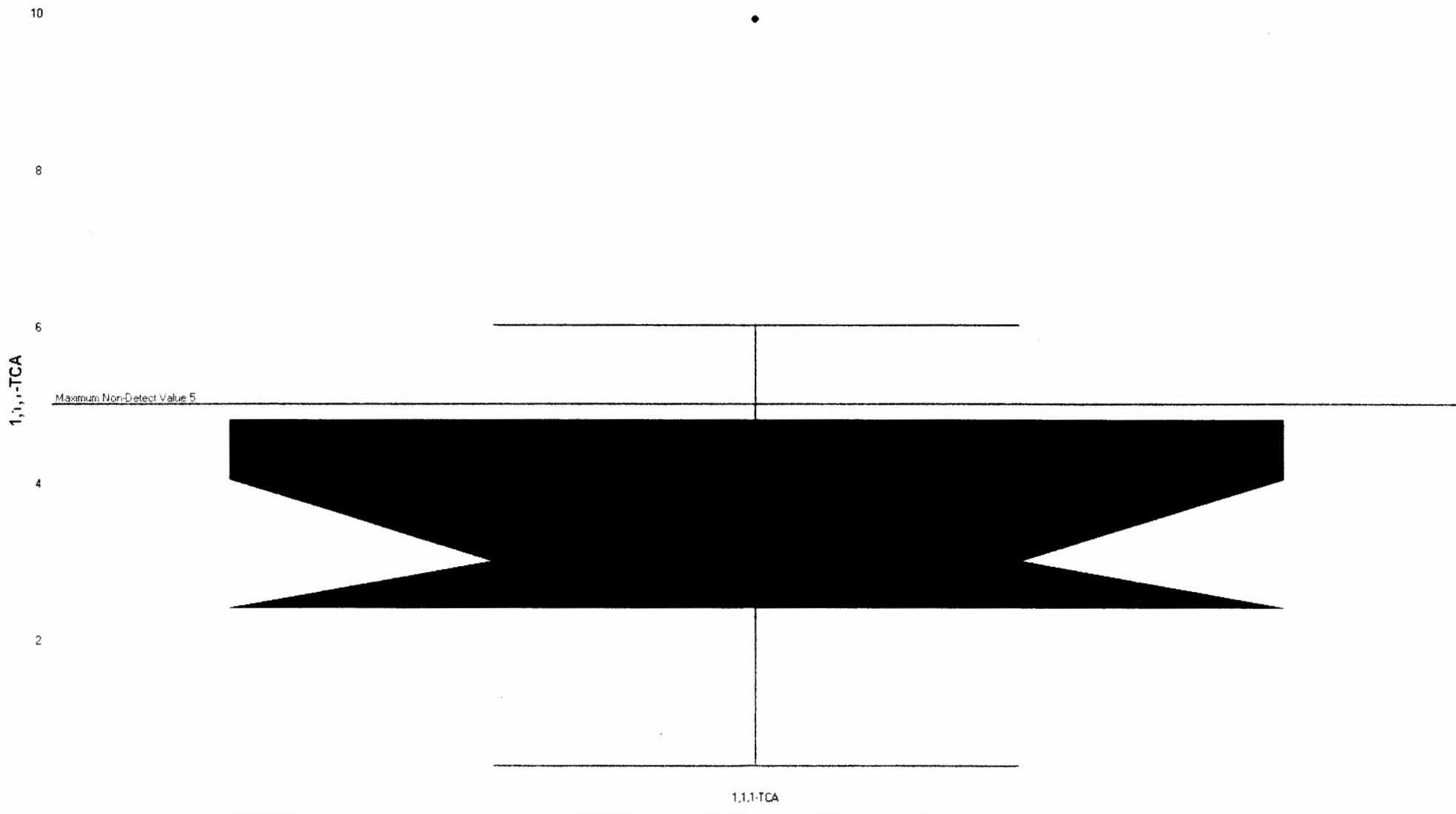
OLS Regression Slope	-0.0009
OLS Regression Intercept	34.0490

Theil-Sen Trend Line (Red)

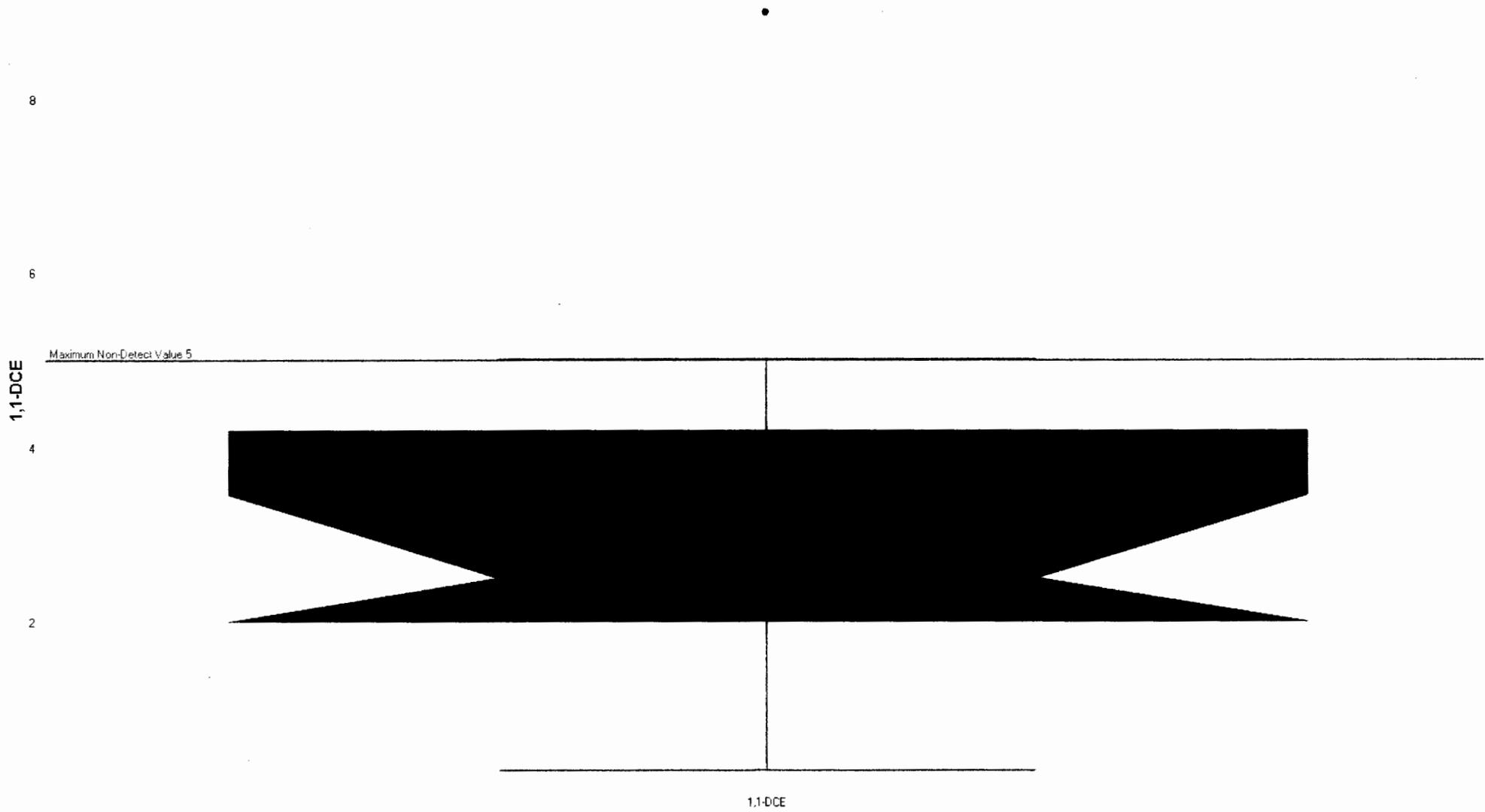
Theil-Sen Slope	-0.0044
Theil-Sen Intercept	37.6610

Insufficient statistical evidence of a significant trend at the specified level of significance.

Box Plot for 1,1,1-TCA

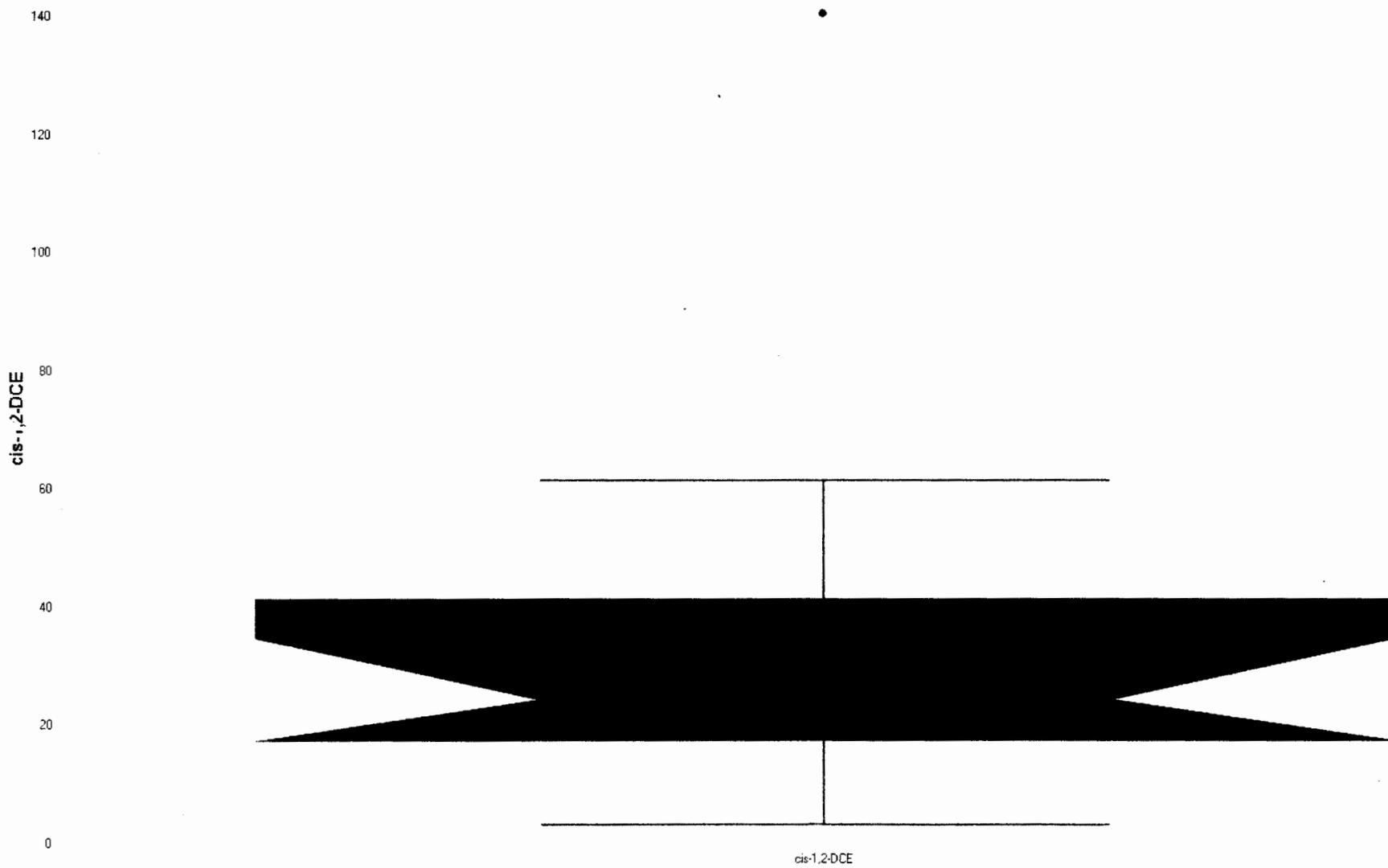


Box Plot for 1,1-DCE



1,1-DCE

Box Plot for cis-1,2-DCE



	A	B	C	D	E	F	G	H	I	J	K	L
1					Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit							
2	User Selected Options											
3	Date/Time of Computation				6/13/2014 10:44:21 AM							
4	From File				Ametek_ProUCL_Input_ES with Dates.xls							
5	Full Precision				OFF							
6												
7												
8	Dixon's Outlier Test for 1,1-DCE											
9												
10	Total N = 19											
11	Number NDs = 1											
12	Number Detects = 18											
13	Number Data (n) = 19											
14	10% critical value: 0.412											
15	5% critical value: 0.462											
16	1% critical value: 0.547											
17	Note: NDs replaced by DL/2 in Outlier Test											
18												
19	1. Data Value 960 is a Potential Outlier (Upper Tail)?											
20												
21	Test Statistic: 0.302											
22												
23	For 10% significance level, 960 is not an outlier.											
24	For 5% significance level, 960 is not an outlier.											
25	For 1% significance level, 960 is not an outlier.											
26												
27	Data Value 29 is a Potential Outlier (Lower Tail)?											
28												
29	Test Statistic: 0.106											
30												
31	For 10% significance level, 29 is not an outlier.											
32	For 5% significance level, 29 is not an outlier.											
33	For 1% significance level, 29 is not an outlier.											
34												
35												
36	Dixon's Outlier Test for PCE											
37												
38	Total N = 19											
39	Number NDs = 2											
40	Number Detects = 17											
41	Number Data (n) = 19											
42	10% critical value: 0.412											
43	5% critical value: 0.462											
44	1% critical value: 0.547											
45	Note: NDs replaced by DL/2 in Outlier Test											
46												
47	1. Data Value 190 is a Potential Outlier (Upper Tail)?											
48												
49	Test Statistic: 0.229											
50												
51	For 10% significance level, 190 is not an outlier.											
52	For 5% significance level, 190 is not an outlier.											
53	For 1% significance level, 190 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
56												
57	Test Statistic: 0.246											
58												
59	For 10% significance level, 26 is not an outlier.											
60	For 5% significance level, 26 is not an outlier.											
61	For 1% significance level, 26 is not an outlier.											
62												
63												
64	Dixon's Outlier Test for 1,1,1-TCA											
65												
66	Total N = 19											
67	Number NDs = 1											
68	Number Detects = 18											
69	Number Data (n) = 19											
70	10% critical value: 0.412											
71	5% critical value: 0.462											
72	1% critical value: 0.547											
73	Note: NDs replaced by DL/2 in Outlier Test											
74												
75	1. Data Value 1300 is a Potential Outlier (Upper Tail)?											
76												
77	Test Statistic: 0.259											
78												
79	For 10% significance level, 1300 is not an outlier.											
80	For 5% significance level, 1300 is not an outlier.											
81	For 1% significance level, 1300 is not an outlier.											
82												
83	2. Data Value 32 is a Potential Outlier (Lower Tail)?											
84												
85	Test Statistic: 0.112											
86												
87	For 10% significance level, 32 is not an outlier.											
88	For 5% significance level, 32 is not an outlier.											
89	For 1% significance level, 32 is not an outlier.											
90												
91												
92	Dixon's Outlier Test for TCE											
93												
94	Total N = 19											
95	Number NDs = 0											
96	Number Detects = 19											
97	Number Data (n) = 19											
98	10% critical value: 0.412											
99	5% critical value: 0.462											
100	1% critical value: 0.547											
101	Note: NDs replaced by DL/2 in Outlier Test											
102												
103	1. Data Value 14000 is a Potential Outlier (Upper Tail)?											
104												
105	Test Statistic: 0.376											
106												
107	For 10% significance level, 14000 is not an outlier.											
108	For 5% significance level, 14000 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
111	2. Data Value 370 is a Potential Outlier (Lower Tail)?											
112												
113	Test Statistic: 0.127											
114												
115	For 10% significance level, 370 is not an outlier.											
116	For 5% significance level, 370 is not an outlier.											
117	For 1% significance level, 370 is not an outlier.											
118												
119												
120	Dixon's Outlier Test for cis-1,2-DCE											
121												
122	Total N = 19											
123	Number NDs = 0											
124	Number Detects = 19											
125	Number Data (n) = 19											
126	10% critical value: 0.412											
127	5% critical value: 0.462											
128	1% critical value: 0.547											
129	Note: NDs replaced by DL/2 in Outlier Test											
130												
131	1. Data Value 11000 is a Potential Outlier (Upper Tail)?											
132												
133	Test Statistic: 0.337											
134												
135	For 10% significance level, 11000 is not an outlier.											
136	For 5% significance level, 11000 is not an outlier.											
137	For 1% significance level, 11000 is not an outlier.											
138												
139	2. Data Value 270 is a Potential Outlier (Lower Tail)?											
140												
141	Test Statistic: 0.125											
142												
143	For 10% significance level, 270 is not an outlier.											
144	For 5% significance level, 270 is not an outlier.											
145	For 1% significance level, 270 is not an outlier.											
146												
147												
148	Dixon's Outlier Test for 1,4-Dioxane											
149												
150	Total N = 19											
151	Number NDs = 0											
152	Number Detects = 19											
153	Number Data (n) = 19											
154	10% critical value: 0.412											
155	5% critical value: 0.462											
156	1% critical value: 0.547											
157	Note: NDs replaced by DL/2 in Outlier Test											
158												
159	1. Data Value 660 is a Potential Outlier (Upper Tail)?											
160												
161	Test Statistic: 0.325											
162												
163	For 10% significance level, 660 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
1	Outlier Tests for Selected Variables replacing nondetects with 1/2 the Detection Limit											
2	User Selected Options											
3	Date/Time of Computation		6/13/2014 10:46:30 AM									
4			From File	Ametek_ProUCL_Input_ES with Dates_a.xls								
5			Full Precision	OFF								
6												
7												
8	Dixon's Outlier Test for 1,1-DCE											
9												
10	Total N = 13											
11	Number NDs = 2											
12	Number Detects = 11											
13	Number Data (n) = 13											
14	10% critical value: 0.467											
15	5% critical value: 0.521											
16	1% critical value: 0.615											
17	Note: NDs replaced by DL/2 in Outlier Test											
18												
19	1. Data Value 9 is a Potential Outlier (Upper Tail)?											
20												
21	Test Statistic: 0.600											
22												
23	For 10% significance level, 9 is an outlier.											
24	For 5% significance level, 9 is an outlier.											
25	For 1% significance level, 9 is not an outlier.											
26												
27	Data Value 0.3 is a Potential Outlier (Lower Tail)?											
28												
29	Test Statistic: 0.362											
30												
31	For 10% significance level, 0.3 is not an outlier.											
32	For 5% significance level, 0.3 is not an outlier.											
33	For 1% significance level, 0.3 is not an outlier.											
34												
35												
36	Dixon's Outlier Test for PCE											
37												
38	Total N = 13											
39	Number NDs = 2											
40	Number Detects = 11											
41	Number Data (n) = 13											
42	10% critical value: 0.467											
43	5% critical value: 0.521											
44	1% critical value: 0.615											
45	Note: NDs replaced by DL/2 in Outlier Test											
46												
47	1. Data Value 8 is a Potential Outlier (Upper Tail)?											
48												
49	Test Statistic: 0.046											
50												
51	For 10% significance level, 8 is not an outlier.											
52	For 5% significance level, 8 is not an outlier.											
53	For 1% significance level, 8 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
56												
57	Test Statistic: 0.181											
58												
59	For 10% significance level, 0.8 is not an outlier.											
60	For 5% significance level, 0.8 is not an outlier.											
61	For 1% significance level, 0.8 is not an outlier.											
62												
63												
64	Dixon's Outlier Test for 1,1,1-TCA											
65												
66	Total N = 13											
67	Number NDs = 2											
68	Number Detects = 11											
69	Number Data (n) = 13											
70	10% critical value: 0.467											
71	5% critical value: 0.521											
72	1% critical value: 0.615											
73	Note: NDs replaced by DL/2 in Outlier Test											
74												
75	1. Data Value 9.9 is a Potential Outlier (Upper Tail)?											
76												
77	Test Statistic: 0.573											
78												
79	For 10% significance level, 9.9 is an outlier.											
80	For 5% significance level, 9.9 is an outlier.											
81	For 1% significance level, 9.9 is not an outlier.											
82												
83	2. Data Value 0.4 is a Potential Outlier (Lower Tail)?											
84												
85	Test Statistic: 0.286											
86												
87	For 10% significance level, 0.4 is not an outlier.											
88	For 5% significance level, 0.4 is not an outlier.											
89	For 1% significance level, 0.4 is not an outlier.											
90												
91												
92	Dixon's Outlier Test for TCE											
93												
94	Total N = 13											
95	Number NDs = 0											
96	Number Detects = 13											
97	Number Data (n) = 13											
98	10% critical value: 0.467											
99	5% critical value: 0.521											
100	1% critical value: 0.615											
101	Note: NDs replaced by DL/2 in Outlier Test											
102												
103	1. Data Value 74 is a Potential Outlier (Upper Tail)?											
104												
105	Test Statistic: 0.235											
106												
107	For 10% significance level, 74 is not an outlier.											
108	For 5% significance level, 74 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
111	2. Data Value 5.6 is a Potential Outlier (Lower Tail)?											
112												
113	Test Statistic: 0.097											
114												
115	For 10% significance level, 5.6 is not an outlier.											
116	For 5% significance level, 5.6 is not an outlier.											
117	For 1% significance level, 5.6 is not an outlier.											
118												
119												
120	Dixon's Outlier Test for cis-1,2-DCE											
121												
122	Total N = 13											
123	Number NDs = 0											
124	Number Detects = 13											
125	Number Data (n) = 13											
126	10% critical value: 0.467											
127	5% critical value: 0.521											
128	1% critical value: 0.615											
129	Note: NDs replaced by DL/2 in Outlier Test											
130												
131	1. Data Value 140 is a Potential Outlier (Upper Tail)?											
132												
133	Test Statistic: 0.723											
134												
135	For 10% significance level, 140 is an outlier.											
136	For 5% significance level, 140 is an outlier.											
137	For 1% significance level, 140 is an outlier.											
138												
139	2. Data Value 3 is a Potential Outlier (Lower Tail)?											
140												
141	Test Statistic: 0.241											
142												
143	For 10% significance level, 3 is not an outlier.											
144	For 5% significance level, 3 is not an outlier.											
145	For 1% significance level, 3 is not an outlier.											
146												
147												
148	Dixon's Outlier Test for 1,4-Dioxane											
149												
150	Total N = 13											
151	Number NDs = 2											
152	Number Detects = 11											
153	Number Data (n) = 13											
154	10% critical value: 0.467											
155	5% critical value: 0.521											
156	1% critical value: 0.615											
157	Note: NDs replaced by DL/2 in Outlier Test											
158												
159	1. Data Value 3.7 is a Potential Outlier (Upper Tail)?											
160												
161	Test Statistic: 0.313											
162												
163	For 10% significance level, 3.7 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L	
1	UCL Statistics for Data Sets with Non-Detects												
2													
3	User Selected Options												
4	Date/Time of Computation	6/13/2014 10:58:33 AM											
5	From File	Ametek_ProUCL_Input_ES with Dates.xls											
6	Full Precision	OFF											
7	Confidence Coefficient	95%											
8	Number of Bootstrap Operations	2000											
9													
10	1,1-DCE												
11													
12	General Statistics												
13	Total Number of Observations	19						Number of Distinct Observations	18				
14	Number of Detects	18						Number of Non-Detects	1				
15	Number of Distinct Detects	18						Number of Distinct Non-Detects	1				
16	Minimum Detect	29						Minimum Non-Detect	200				
17	Maximum Detect	960						Maximum Non-Detect	200				
18	Variance Detects	75229						Percent Non-Detects	5.263%				
19	Mean Detects	397.2						SD Detects	274.3				
20	Median Detects	365						CV Detects	0.691				
21	Skewness Detects	0.442						Kurtosis Detects	-0.771				
22	Mean of Logged Detects	5.662						SD of Logged Detects	0.939				
23													
24	Normal GOF Test on Detects Only												
25	Shapiro Wilk Test Statistic	0.939						Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value	0.897						Detected Data appear Normal at 5% Significance Level					
27	Lilliefors Test Statistic	0.153						Lilliefors GOF Test					
28	5% Lilliefors Critical Value	0.209						Detected Data appear Normal at 5% Significance Level					
29	Detected Data appear Normal at 5% Significance Level												
30													
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
32	Mean	382						Standard Error of Mean	63.2				
33	SD	267.5						95% KM (BCA) UCL	483.4				
34	95% KM (t) UCL	491.6						95% KM (Percentile Bootstrap) UCL	484.7				
35	95% KM (z) UCL	485.9						95% KM Bootstrap t UCL	492				
36	90% KM Chebyshev UCL	571.6						95% KM Chebyshev UCL	657.5				
37	97.5% KM Chebyshev UCL	776.7						99% KM Chebyshev UCL	1011				
38													
39	Gamma GOF Tests on Detected Observations Only												
40	A-D Test Statistic	0.396						Anderson-Darling GOF Test					
41	5% A-D Critical Value	0.755						Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic	0.177						Kolmogrov-Smirnoff GOF					
43	5% K-S Critical Value	0.207						Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level												
45													
46	Gamma Statistics on Detected Data Only												
47	k hat (MLE)	1.697						k star (bias corrected MLE)	1.451				
48	Theta hat (MLE)	234.1						Theta star (bias corrected MLE)	273.7				
49	nu hat (MLE)	61.09						nu star (bias corrected)	52.24				
50	MLE Mean (bias corrected)	397.2						MLE Sd (bias corrected)	329.7				
51													
52	Gamma Kaplan-Meier (KM) Statistics												
53	k hat (KM)	2.038						nu hat (KM)	77.46				

	A	B	C	D	E	F	G	H	I	J	K	L
56	Gamma ROS Statistics using Imputed Non-Detects											
57	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
58	GROS may not be used when kstar of detected data is small such as < 0.1											
59	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
60	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
61												
62	Minimum			29			Mean			383.2		
63	Maximum			960			Median			330		
64	SD			273.4			CV			0.714		
65	k hat (MLE)			1.671			k star (bias corrected MLE)			1.443		
66	Theta hat (MLE)			229.3			Theta star (bias corrected MLE)			265.6		
67	nu hat (MLE)			63.51			nu star (bias corrected)			54.82		
68	MLE Mean (bias corrected)			383.2			MLE Sd (bias corrected)			319		
69							Adjusted Level of Significance (β)			0.0369		
70	Approximate Chi Square Value (54.82, α)			38.8			Adjusted Chi Square Value (54.82, β)			37.63		
71	95% Gamma Approximate UCL (use when $n \geq 50$)			541.3			95% Gamma Adjusted UCL (use when $n < 50$)			558.3		
72												
73	Lognormal GOF Test on Detected Observations Only											
74	Shapiro Wilk Test Statistic			0.921			Shapiro Wilk GOF Test					
75	5% Shapiro Wilk Critical Value			0.897			Detected Data appear Lognormal at 5% Significance Level					
76	Lilliefors Test Statistic			0.18			Lilliefors GOF Test					
77	5% Lilliefors Critical Value			0.209			Detected Data appear Lognormal at 5% Significance Level					
78	Detected Data appear Lognormal at 5% Significance Level											
79												
80	Lognormal ROS Statistics Using Imputed Non-Detects											
81	Mean in Original Scale			382.1			Mean in Log Scale			5.611		
82	SD in Original Scale			274.5			SD in Log Scale			0.939		
83	95% t UCL (assumes normality of ROS data)			491.3			95% Percentile Bootstrap UCL			481.6		
84	95% BCA Bootstrap UCL			490			95% Bootstrap t UCL			505.4		
85	95% H-UCL (Log ROS)			742.8								
86												
87	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
88	KM Mean (logged)			5.604			95% H-UCL (KM -Log)			726.7		
89	KM SD (logged)			0.931			95% Critical H Value (KM-Log)			2.514		
90	KM Standard Error of Mean (logged)			0.222								
91												
92	DL/2 Statistics											
93	DL/2 Normal						DL/2 Log-Transformed					
94	Mean in Original Scale			381.5			Mean in Log Scale			5.606		
95	SD in Original Scale			275.1			SD in Log Scale			0.944		
96	95% t UCL (Assumes normality)			491			95% H-Stat UCL			746.6		
97	DL/2 is not a recommended method, provided for comparisons and historical reasons											
98												
99	Nonparametric Distribution Free UCL Statistics											
100	Detected Data appear Normal Distributed at 5% Significance Level											
101												
102	Suggested UCL to Use											
103	95% KM (t) UCL			491.6			95% KM (Percentile Bootstrap) UCL			484.7		
104												
105	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
106	Recommendations are based upon data size, data distribution, and skewness.											
107	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
108	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
111												
112	General Statistics											
113	Total Number of Observations				19		Number of Distinct Observations				16	
114	Number of Detects				17		Number of Non-Detects				2	
115	Number of Distinct Detects				15		Number of Distinct Non-Detects				1	
116	Minimum Detect				26		Minimum Non-Detect				200	
117	Maximum Detect				190		Maximum Non-Detect				200	
118	Variance Detects				1988		Percent Non-Detects				10.53%	
119	Mean Detects				99.82		SD Detects				44.58	
120	Median Detects				88		CV Detects				0.447	
121	Skewness Detects				0.445		Kurtosis Detects				-0.447	
122	Mean of Logged Detects				4.497		SD of Logged Detects				0.502	
123												
124	Normal GOF Test on Detects Only											
125	Shapiro Wilk Test Statistic				0.966		Shapiro Wilk GOF Test					
126	5% Shapiro Wilk Critical Value				0.892		Detected Data appear Normal at 5% Significance Level					
127	Lilliefors Test Statistic				0.158		Lilliefors GOF Test					
128	5% Lilliefors Critical Value				0.215		Detected Data appear Normal at 5% Significance Level					
129	Detected Data appear Normal at 5% Significance Level											
130												
131	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
132	Mean				99.82		Standard Error of Mean				10.81	
133	SD				43.25		95% KM (BCA) UCL				115.9	
134	95% KM (t) UCL				118.6		95% KM (Percentile Bootstrap) UCL				118	
135	95% KM (z) UCL				117.6		95% KM Bootstrap t UCL				120.1	
136	90% KM Chebyshev UCL				132.3		95% KM Chebyshev UCL				147	
137	97.5% KM Chebyshev UCL				167.4		99% KM Chebyshev UCL				207.4	
138												
139	Gamma GOF Tests on Detected Observations Only											
140	A-D Test Statistic				0.189		Anderson-Darling GOF Test					
141	5% A-D Critical Value				0.742		Detected data appear Gamma Distributed at 5% Significance Level					
142	K-S Test Statistic				0.0979		Kolmogrov-Smirnoff GOF					
143	5% K-S Critical Value				0.21		Detected data appear Gamma Distributed at 5% Significance Level					
144	Detected data appear Gamma Distributed at 5% Significance Level											
145												
146	Gamma Statistics on Detected Data Only											
147	k hat (MLE)				4.85		k star (bias corrected MLE)				4.034	
148	Theta hat (MLE)				20.58		Theta star (bias corrected MLE)				24.75	
149	nu hat (MLE)				164.9		nu star (bias corrected)				137.1	
150	MLE Mean (bias corrected)				99.82		MLE Sd (bias corrected)				49.7	
151												
152	Gamma Kaplan-Meier (KM) Statistics											
153	k hat (KM)				5.327		nu hat (KM)				202.4	
154	Approximate Chi Square Value (202.41, α)				170.5		Adjusted Chi Square Value (202.41, β)				167.9	
155	95% Gamma Approximate KM-UCL (use when $n \geq 50$)				118.5		95% Gamma Adjusted KM-UCL (use when $n < 50$)				120.3	
156												
157	Gamma ROS Statistics using Imputed Non-Detects											
158	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
159	GROS may not be used when kstar of detected data is small such as < 0.1											
160	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
161	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
162	Minimum				26		Mean				99.39	
163	Maximum				190		Median				88	

	A	B	C	D	E	F	G	H	I	J	K	L
166				Theta hat (MLE)		18.91			Theta star (bias corrected MLE)			22.28
167				nu hat (MLE)		199.7			nu star (bias corrected)			169.5
168				MLE Mean (bias corrected)		99.39			MLE Sd (bias corrected)			47.05
169									Adjusted Level of Significance (β)			0.0369
170				Approximate Chi Square Value (169.52, α)		140.4			Adjusted Chi Square Value (169.52, β)			138.1
171				95% Gamma Approximate UCL (use when $n \geq 50$)		120			95% Gamma Adjusted UCL (use when $n < 50$)			122
172				Lognormal GOF Test on Detected Observations Only								
173				Lognormal GOF Test on Detected Observations Only								
174				Shapiro Wilk Test Statistic		0.956			Shapiro Wilk GOF Test			
175				5% Shapiro Wilk Critical Value		0.892			Detected Data appear Lognormal at 5% Significance Level			
176				Lilliefors Test Statistic		0.104			Lilliefors GOF Test			
177				5% Lilliefors Critical Value		0.215			Detected Data appear Lognormal at 5% Significance Level			
178				Detected Data appear Lognormal at 5% Significance Level								
179				Detected Data appear Lognormal at 5% Significance Level								
180				Lognormal ROS Statistics Using Imputed Non-Detects								
181				Mean in Original Scale		99.03			Mean in Log Scale			4.497
182				SD in Original Scale		42.72			SD in Log Scale			0.48
183				95% t UCL (assumes normality of ROS data)		116			95% Percentile Bootstrap UCL			115.6
184				95% BCA Bootstrap UCL		115.1			95% Bootstrap t UCL			117.8
185				95% H-UCL (Log ROS)		126.2						
186				UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed								
187				UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed								
188				KM Mean (logged)		4.497			95% H-UCL (KM -Log)			127.1
189				KM SD (logged)		0.487			95% Critical H Value (KM-Log)			1.997
190				KM Standard Error of Mean (logged)		0.122						
191				DL/2 Statistics								
192				DL/2 Statistics								
193				DL/2 Normal					DL/2 Log-Transformed			
194				Mean in Original Scale		99.84			Mean in Log Scale			4.508
195				SD in Original Scale		42.03			SD in Log Scale			0.475
196				95% t UCL (Assumes normality)		116.6			95% H-Stat UCL			126.9
197				DL/2 is not a recommended method, provided for comparisons and historical reasons								
198				DL/2 is not a recommended method, provided for comparisons and historical reasons								
199				Nonparametric Distribution Free UCL Statistics								
200				Detected Data appear Normal Distributed at 5% Significance Level								
201				Detected Data appear Normal Distributed at 5% Significance Level								
202				Suggested UCL to Use								
203				95% KM (t) UCL		118.6			95% KM (Percentile Bootstrap) UCL			118
204				Suggested UCL to Use								
205				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
206				Recommendations are based upon data size, data distribution, and skewness.								
207				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
208				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
209				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
210	1,1,1-TCA											
211												
212				General Statistics								
213				Total Number of Observations		19			Number of Distinct Observations			19
214				Number of Detects		18			Number of Non-Detects			1
215				Number of Distinct Detects		18			Number of Distinct Non-Detects			1
216				Minimum Detect		32			Minimum Non-Detect			200
217				Maximum Detect		1300			Maximum Non-Detect			200
218				Variance Detects		143305			Percent Non-Detects			5.263%

	A	B	C	D	E	F	G	H	I	J	K	L
221				Skewness Detects		0.558				Kurtosis Detects		-0.583
222				Mean of Logged Detects		5.978				SD of Logged Detects		0.954
223				Normal GOF Test on Detects Only								
224				Shapiro Wilk Test Statistic		0.932				Shapiro Wilk GOF Test		
225				5% Shapiro Wilk Critical Value		0.897				Detected Data appear Normal at 5% Significance Level		
226				Lilliefors Test Statistic		0.139				Lilliefors GOF Test		
227				5% Lilliefors Critical Value		0.209				Detected Data appear Normal at 5% Significance Level		
228				Detected Data appear Normal at 5% Significance Level								
229												
230				Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs								
231				Mean	524					Standard Error of Mean		87.37
232				SD	369.9					95% KM (BCA) UCL		658
233				95% KM (t) UCL	675.5					95% KM (Percentile Bootstrap) UCL		671.1
234				95% KM (z) UCL	667.7					95% KM Bootstrap t UCL		689.1
235				90% KM Chebyshev UCL	786.1					95% KM Chebyshev UCL		904.9
236				97.5% KM Chebyshev UCL	1070					99% KM Chebyshev UCL		1393
237												
238				Gamma GOF Tests on Detected Observations Only								
239				A-D Test Statistic		0.355				Anderson-Darling GOF Test		
240				5% A-D Critical Value		0.755				Detected data appear Gamma Distributed at 5% Significance Level		
241				K-S Test Statistic		0.157				Kolmogrov-Smirnoff GOF		
242				5% K-S Critical Value		0.207				Detected data appear Gamma Distributed at 5% Significance Level		
243				Detected data appear Gamma Distributed at 5% Significance Level								
244												
245				Gamma Statistics on Detected Data Only								
246				k hat (MLE)		1.693				k star (bias corrected MLE)		1.448
247				Theta hat (MLE)		322.4				Theta star (bias corrected MLE)		376.9
248				nu hat (MLE)		60.94				nu star (bias corrected)		52.11
249				MLE Mean (bias corrected)		545.7				MLE Sd (bias corrected)		453.5
250												
251				Gamma Kaplan-Meier (KM) Statistics								
252				k hat (KM)		2.007				nu hat (KM)		76.28
253				Approximate Chi Square Value (76.28, α)		57.16				Adjusted Chi Square Value (76.28, β)		55.71
254				95% Gamma Approximate KM-UCL (use when $n \geq 50$)		699.3				95% Gamma Adjusted KM-UCL (use when $n < 50$)		717.4
255												
256				Gamma ROS Statistics using Imputed Non-Detects								
257				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
258				GROS may not be used when kstar of detected data is small such as < 0.1								
259				For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
260				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
261				Minimum		32				Mean		525.1
262				Maximum		1300				Median		540
263				SD		378.6				CV		0.721
264				k hat (MLE)		1.643				k star (bias corrected MLE)		1.418
265				Theta hat (MLE)		319.7				Theta star (bias corrected MLE)		370.2
266				nu hat (MLE)		62.42				nu star (bias corrected)		53.9
267				MLE Mean (bias corrected)		525.1				MLE Sd (bias corrected)		440.9
268												
269				Adjusted Level of Significance (β)								
270				Approximate Chi Square Value (53.90, α)		38.03				Adjusted Chi Square Value (53.90, β)		36.86
271				95% Gamma Approximate UCL (use when $n \geq 50$)		744.2				95% Gamma Adjusted UCL (use when $n < 50$)		767.7
272												
273				Lognormal GOF Test on Detected Observations Only								

	A	B	C	D	E	F	G	H	I	J	K	L	
276				Lilliefors Test Statistic		0.184			Lilliefors GOF Test				
277				5% Lilliefors Critical Value		0.209		Detected Data appear Lognormal at 5% Significance Level					
278	Detected Data appear Lognormal at 5% Significance Level												
279													
280	Lognormal ROS Statistics Using Imputed Non-Detects												
281				Mean in Original Scale		524			Mean in Log Scale			5.922	
282				SD in Original Scale		379.8			SD in Log Scale			0.96	
283				95% t UCL (assumes normality of ROS data)		675.1			95% Percentile Bootstrap UCL			662.6	
284				95% BCA Bootstrap UCL		677.7			95% Bootstrap t UCL			683.6	
285				95% H-UCL (Log ROS)		1054							
286													
287	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
288				KM Mean (logged)		5.914			95% H-UCL (KM -Log)			1037	
289				KM SD (logged)		0.955			95% Critical H Value (KM-Log)			2.548	
290				KM Standard Error of Mean (logged)		0.229							
291													
292	DL/2 Statistics												
293				DL/2 Normal						DL/2 Log-Transformed			
294				Mean in Original Scale		522.2			Mean in Log Scale			5.906	
295				SD in Original Scale		381.8			SD in Log Scale			0.98	
296				95% t UCL (Assumes normality)		674.1			95% H-Stat UCL			1077	
297	DL/2 is not a recommended method, provided for comparisons and historical reasons												
298													
299	Nonparametric Distribution Free UCL Statistics												
300	Detected Data appear Normal Distributed at 5% Significance Level												
301													
302	Suggested UCL to Use												
303				95% KM (t) UCL		675.5			95% KM (Percentile Bootstrap) UCL			671.1	
304													
305	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
306	Recommendations are based upon data size, data distribution, and skewness.												
307	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
308	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
309													
310													
311	TCE												
312													
313	General Statistics												
314				Total Number of Observations		19			Number of Distinct Observations			18	
315									Number of Missing Observations			0	
316				Minimum		370			Mean			5756	
317				Maximum		14000			Median			5900	
318				SD		3954			Std. Error of Mean			907	
319				Coefficient of Variation		0.687			Skewness			0.41	
320													
321	Normal GOF Test												
322				Shapiro Wilk Test Statistic		0.939			Shapiro Wilk GOF Test				
323				5% Shapiro Wilk Critical Value		0.901		Data appear Normal at 5% Significance Level					
324				Lilliefors Test Statistic		0.138			Lilliefors GOF Test				
325				5% Lilliefors Critical Value		0.203		Data appear Normal at 5% Significance Level					
326	Data appear Normal at 5% Significance Level												
327													
328	Assuming Normal Distribution												

	A	B	C	D	E	F	G	H	I	J	K	L
331									95% Modified-t UCL (Johnson-1978)			7343
332												
333						Gamma GOF Test						
334				A-D Test Statistic		0.488			Anderson-Darling Gamma GOF Test			
335				5% A-D Critical Value		0.755		Detected data appear Gamma Distributed at 5% Significance Level				
336				K-S Test Statistic		0.142		Kolmogrov-Smirnoff Gamma GOF Test				
337				5% K-S Critical Value		0.202		Detected data appear Gamma Distributed at 5% Significance Level				
338				Detected data appear Gamma Distributed at 5% Significance Level								
339												
340						Gamma Statistics						
341				k hat (MLE)		1.654			k star (bias corrected MLE)			1.428
342				Theta hat (MLE)		3481			Theta star (bias corrected MLE)			4032
343				nu hat (MLE)		62.84			nu star (bias corrected)			54.25
344				MLE Mean (bias corrected)		5756			MLE Sd (bias corrected)			4818
345									Approximate Chi Square Value (0.05)			38.33
346				Adjusted Level of Significance		0.0369			Adjusted Chi Square Value			37.16
347												
348						Assuming Gamma Distribution						
349				95% Approximate Gamma UCL (use when n>=50))		8148			95% Adjusted Gamma UCL (use when n<50)			8404
350												
351						Lognormal GOF Test						
352				Shapiro Wilk Test Statistic		0.907			Shapiro Wilk Lognormal GOF Test			
353				5% Shapiro Wilk Critical Value		0.901		Data appear Lognormal at 5% Significance Level				
354				Lilliefors Test Statistic		0.171		Lilliefors Lognormal GOF Test				
355				5% Lilliefors Critical Value		0.203		Data appear Lognormal at 5% Significance Level				
356				Data appear Lognormal at 5% Significance Level								
357												
358						Lognormal Statistics						
359				Minimum of Logged Data		5.914			Mean of logged Data			8.326
360				Maximum of Logged Data		9.547			SD of logged Data			0.962
361												
362						Assuming Lognormal Distribution						
363				95% H-UCL		11706			90% Chebyshev (MVUE) UCL			10993
364				95% Chebyshev (MVUE) UCL		13100			97.5% Chebyshev (MVUE) UCL			16024
365				99% Chebyshev (MVUE) UCL		21768						
366												
367						Nonparametric Distribution Free UCL Statistics						
368				Data appear to follow a Discernible Distribution at 5% Significance Level								
369												
370						Nonparametric Distribution Free UCLs						
371				95% CLT UCL		7248			95% Jackknife UCL			7329
372				95% Standard Bootstrap UCL		7186			95% Bootstrap-t UCL			7408
373				95% Hall's Bootstrap UCL		7336			95% Percentile Bootstrap UCL			7251
374				95% BCA Bootstrap UCL		7195						
375				90% Chebyshev(Mean, Sd) UCL		8477			95% Chebyshev(Mean, Sd) UCL			9710
376				97.5% Chebyshev(Mean, Sd) UCL		11421			99% Chebyshev(Mean, Sd) UCL			14781
377												
378						Suggested UCL to Use						
379				95% Student's-t UCL		7329						
380												
381				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
382				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
383				and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.								

	A	B	C	D	E	F	G	H	I	J	K	L
386												
387	cis-1,2-DCE											
388												
389	General Statistics											
390	Total Number of Observations				19		Number of Distinct Observations				17	
391							Number of Missing Observations				0	
392	Minimum				270		Mean				4714	
393	Maximum				11000		Median				4100	
394	SD				3336		Std. Error of Mean				765.3	
395	Coefficient of Variation				0.708		Skewness				0.435	
396												
397	Normal GOF Test											
398	Shapiro Wilk Test Statistic				0.914		Shapiro Wilk GOF Test					
399	5% Shapiro Wilk Critical Value				0.901		Data appear Normal at 5% Significance Level					
400	Lilliefors Test Statistic				0.16		Lilliefors GOF Test					
401	5% Lilliefors Critical Value				0.203		Data appear Normal at 5% Significance Level					
402	Data appear Normal at 5% Significance Level											
403												
404	Assuming Normal Distribution											
405	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
406	95% Student's-t UCL				6041		95% Adjusted-CLT UCL (Chen-1995)				6055	
407							95% Modified-t UCL (Johnson-1978)				6054	
408												
409	Gamma GOF Test											
410	A-D Test Statistic				0.597		Anderson-Darling Gamma GOF Test					
411	5% A-D Critical Value				0.756		Detected data appear Gamma Distributed at 5% Significance Level					
412	K-S Test Statistic				0.192		Kolmogrov-Smirnoff Gamma GOF Test					
413	5% K-S Critical Value				0.202		Detected data appear Gamma Distributed at 5% Significance Level					
414	Detected data appear Gamma Distributed at 5% Significance Level											
415												
416	Gamma Statistics											
417	k hat (MLE)				1.563		k star (bias corrected MLE)				1.352	
418	Theta hat (MLE)				3015		Theta star (bias corrected MLE)				3488	
419	nu hat (MLE)				59.41		nu star (bias corrected)				51.36	
420	MLE Mean (bias corrected)				4714		MLE Sd (bias corrected)				4055	
421							Approximate Chi Square Value (0.05)				35.9	
422	Adjusted Level of Significance				0.0369		Adjusted Chi Square Value				34.77	
423												
424	Assuming Gamma Distribution											
425	95% Approximate Gamma UCL (use when n>=50)				6744		95% Adjusted Gamma UCL (use when n<50)				6963	
426												
427	Lognormal GOF Test											
428	Shapiro Wilk Test Statistic				0.897		Shapiro Wilk Lognormal GOF Test					
429	5% Shapiro Wilk Critical Value				0.901		Data Not Lognormal at 5% Significance Level					
430	Lilliefors Test Statistic				0.199		Lilliefors Lognormal GOF Test					
431	5% Lilliefors Critical Value				0.203		Data appear Lognormal at 5% Significance Level					
432	Data appear Approximate Lognormal at 5% Significance Level											
433												
434	Lognormal Statistics											
435	Minimum of Logged Data				5.598		Mean of logged Data				8.106	
436	Maximum of Logged Data				9.306		SD of logged Data				0.993	
437												
438	Assuming Lognormal Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L	
441	99% Chebyshev (MVUE) UCL						18430						
442	Nonparametric Distribution Free UCL Statistics												
443	Data appear to follow a Discernible Distribution at 5% Significance Level												
444	Nonparametric Distribution Free UCLs												
445	Nonparametric Distribution Free UCLs												
446	95% CLT UCL						5973	95% Jackknife UCL				6041	
447	95% Standard Bootstrap UCL						5932	95% Bootstrap-t UCL				6087	
448	95% Hall's Bootstrap UCL						6001	95% Percentile Bootstrap UCL				5968	
449	95% BCA Bootstrap UCL						5984						
450	90% Chebyshev(Mean, Sd) UCL						7010	95% Chebyshev(Mean, Sd) UCL				8050	
451	97.5% Chebyshev(Mean, Sd) UCL						9494	99% Chebyshev(Mean, Sd) UCL				12329	
452	Suggested UCL to Use												
453	Suggested UCL to Use												
454	95% Student's-t UCL						6041						
455	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
456	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
457	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
458	For additional insight the user may want to consult a statistician.												
459	For additional insight the user may want to consult a statistician.												
460	For additional insight the user may want to consult a statistician.												
461	For additional insight the user may want to consult a statistician.												
462	For additional insight the user may want to consult a statistician.												
463	1,4-Dioxane												
464	General Statistics												
465	Total Number of Observations						19	Number of Distinct Observations				17	
466								Number of Missing Observations				0	
467	Minimum						19	Mean				256	
468	Maximum						660	Median				260	
469	SD						176.7	Std. Error of Mean				40.55	
470	Coefficient of Variation						0.69	Skewness				0.831	
471	Normal GOF Test												
472	Normal GOF Test												
473	Shapiro Wilk Test Statistic						0.927	Shapiro Wilk GOF Test					
474	5% Shapiro Wilk Critical Value						0.901	Data appear Normal at 5% Significance Level					
475	Lilliefors Test Statistic						0.139	Lilliefors GOF Test					
476	5% Lilliefors Critical Value						0.203	Data appear Normal at 5% Significance Level					
477	Data appear Normal at 5% Significance Level												
478	Data appear Normal at 5% Significance Level												
479	Assuming Normal Distribution												
480	95% Normal UCL							95% UCLs (Adjusted for Skewness)					
481	95% Student's-t UCL						326.3	95% Adjusted-CLT UCL (Chen-1995)				331	
482								95% Modified-t UCL (Johnson-1978)				327.6	
483	Gamma GOF Test												
484	Gamma GOF Test												
485	A-D Test Statistic						0.285	Anderson-Darling Gamma GOF Test					
486	5% A-D Critical Value						0.753	Detected data appear Gamma Distributed at 5% Significance Level					
487	K-S Test Statistic						0.131	Kolmogrov-Smirnoff Gamma GOF Test					
488	5% K-S Critical Value						0.201	Detected data appear Gamma Distributed at 5% Significance Level					
489	Detected data appear Gamma Distributed at 5% Significance Level												
490	Detected data appear Gamma Distributed at 5% Significance Level												
491	Gamma Statistics												
492	Gamma Statistics												
493	k hat (MLE)						1.88	k star (bias corrected MLE)				1.618	

	A	B	C	D	E	F	G	H	I	J	K	L
496	MLE Mean (bias corrected)					256	MLE Sd (bias corrected)					201.3
497						Approximate Chi Square Value (0.05)					44.45	
498	Adjusted Level of Significance					0.0369	Adjusted Chi Square Value					43.18
499												
500	Assuming Gamma Distribution											
501	95% Approximate Gamma UCL (use when n>=50))					354.1	95% Adjusted Gamma UCL (use when n<50)					364.5
502												
503	Lognormal GOF Test											
504	Shapiro Wilk Test Statistic					0.928	Shapiro Wilk Lognormal GOF Test					
505	5% Shapiro Wilk Critical Value					0.901	Data appear Lognormal at 5% Significance Level					
506	Lilliefors Test Statistic					0.162	Lilliefors Lognormal GOF Test					
507	5% Lilliefors Critical Value					0.203	Data appear Lognormal at 5% Significance Level					
508	Data appear Lognormal at 5% Significance Level											
509												
510	Lognormal Statistics											
511	Minimum of Logged Data					2.944	Mean of logged Data					5.256
512	Maximum of Logged Data					6.492	SD of logged Data					0.878
513												
514	Assuming Lognormal Distribution											
515	95% H-UCL					467.6	90% Chebyshev (MVUE) UCL					456.2
516	95% Chebyshev (MVUE) UCL					538.4	97.5% Chebyshev (MVUE) UCL					652.6
517	99% Chebyshev (MVUE) UCL					876.9						
518												
519	Nonparametric Distribution Free UCL Statistics											
520	Data appear to follow a Discernible Distribution at 5% Significance Level											
521												
522	Nonparametric Distribution Free UCLs											
523	95% CLT UCL					322.7	95% Jackknife UCL					326.3
524	95% Standard Bootstrap UCL					323.2	95% Bootstrap-t UCL					335.2
525	95% Hall's Bootstrap UCL					332.3	95% Percentile Bootstrap UCL					324.5
526	95% BCA Bootstrap UCL					330.3						
527	90% Chebyshev(Mean, Sd) UCL					377.6	95% Chebyshev(Mean, Sd) UCL					432.7
528	97.5% Chebyshev(Mean, Sd) UCL					509.2	99% Chebyshev(Mean, Sd) UCL					659.4
529												
530	Suggested UCL to Use											
531	95% Student's-t UCL					326.3						
532												
533	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
534	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
535	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
536	For additional insight the user may want to consult a statistician.											
537												

	A	B	C	D	E	F	G	H	I	J	K	L	
1	UCL Statistics for Data Sets with Non-Detects												
2													
3	User Selected Options												
4	Date/Time of Computation	6/13/2014 10:59:53 AM											
5	From File	Ametek_ProUCL_Input_ES with Dates_a.xls											
6	Full Precision	OFF											
7	Confidence Coefficient	95%											
8	Number of Bootstrap Operations	2000											
9													
10	1,1-DCE												
11													
12	General Statistics												
13	Total Number of Observations	13							Number of Distinct Observations	9			
14	Number of Detects	11							Number of Non-Detects	2			
15	Number of Distinct Detects	9							Number of Distinct Non-Detects	2			
16	Minimum Detect	0.3							Minimum Non-Detect	2			
17	Maximum Detect	9							Maximum Non-Detect	5			
18	Variance Detects	5.235							Percent Non-Detects	15.38%			
19	Mean Detects	3.336							SD Detects	2.288			
20	Median Detects	2.5							CV Detects	0.686			
21	Skewness Detects	1.539							Kurtosis Detects	3.416			
22	Mean of Logged Detects	0.953							SD of Logged Detects	0.856			
23													
24	Normal GOF Test on Detects Only												
25	Shapiro Wilk Test Statistic	0.863							Shapiro Wilk GOF Test				
26	5% Shapiro Wilk Critical Value	0.85							Detected Data appear Normal at 5% Significance Level				
27	Lilliefors Test Statistic	0.189							Lilliefors GOF Test				
28	5% Lilliefors Critical Value	0.267							Detected Data appear Normal at 5% Significance Level				
29	Detected Data appear Normal at 5% Significance Level												
30													
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
32	Mean	3.023							Standard Error of Mean	0.649			
33	SD	2.201							95% KM (BCA) UCL	4.331			
34	95% KM (t) UCL	4.18							95% KM (Percentile Bootstrap) UCL	4.137			
35	95% KM (z) UCL	4.091							95% KM Bootstrap t UCL	4.543			
36	90% KM Chebyshev UCL	4.97							95% KM Chebyshev UCL	5.852			
37	97.5% KM Chebyshev UCL	7.076							99% KM Chebyshev UCL	9.481			
38													
39	Gamma GOF Tests on Detected Observations Only												
40	A-D Test Statistic	0.443							Anderson-Darling GOF Test				
41	5% A-D Critical Value	0.738							Detected data appear Gamma Distributed at 5% Significance Level				
42	K-S Test Statistic	0.235							Kolmogrov-Smirnoff GOF				
43	5% K-S Critical Value	0.258							Detected data appear Gamma Distributed at 5% Significance Level				
44	Detected data appear Gamma Distributed at 5% Significance Level												
45													
46	Gamma Statistics on Detected Data Only												
47	k hat (MLE)	2.137							k star (bias corrected MLE)	1.615			
48	Theta hat (MLE)	1.561							Theta star (bias corrected MLE)	2.066			
49	nu hat (MLE)	47.01							nu star (bias corrected)	35.52			
50	MLE Mean (bias corrected)	3.336							MLE Sd (bias corrected)	2.626			
51													
52	Gamma Kaplan-Meier (KM) Statistics												
53	k hat (KM)	1.887							nu hat (KM)	49.06			

	A	B	C	D	E	F	G	H	I	J	K	L
56	Gamma ROS Statistics using Imputed Non-Detects											
57	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
58	GROS may not be used when kstar of detected data is small such as < 0.1											
59	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
60	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
61	Minimum 0.3 Mean 3.029											
62	Maximum 9 Median 2.4											
63	SD 2.246 CV 0.741											
64	k hat (MLE) 1.837 k star (bias corrected MLE) 1.464											
65	Theta hat (MLE) 1.649 Theta star (bias corrected MLE) 2.069											
66	nu hat (MLE) 47.75 nu star (bias corrected) 38.07											
67	MLE Mean (bias corrected) 3.029 MLE Sd (bias corrected) 2.504											
68	Adjusted Level of Significance (β) 0.0301											
69	Approximate Chi Square Value (38.07, α) 24.94 Adjusted Chi Square Value (38.07, β) 23.43											
70	95% Gamma Approximate UCL (use when $n \geq 50$) 4.624 95% Gamma Adjusted UCL (use when $n < 50$) 4.921											
71	95% Gamma Approximate UCL (use when $n \geq 50$) 4.624 95% Gamma Adjusted UCL (use when $n < 50$) 4.921											
72	Lognormal GOF Test on Detected Observations Only											
73	Shapiro Wilk Test Statistic 0.852 Shapiro Wilk GOF Test											
74	5% Shapiro Wilk Critical Value 0.85 Detected Data appear Lognormal at 5% Significance Level											
75	Lilliefors Test Statistic 0.29 Lilliefors GOF Test											
76	5% Lilliefors Critical Value 0.267 Detected Data Not Lognormal at 5% Significance Level											
77	Detected Data appear Approximate Lognormal at 5% Significance Level											
78	Detected Data appear Approximate Lognormal at 5% Significance Level											
79	Lognormal ROS Statistics Using Imputed Non-Detects											
80	Lognormal ROS Statistics Using Imputed Non-Detects											
81	Mean in Original Scale 3.019 Mean in Log Scale 0.823											
82	SD in Original Scale 2.242 SD in Log Scale 0.871											
83	95% t UCL (assumes normality of ROS data) 4.127 95% Percentile Bootstrap UCL 4.127											
84	95% BCA Bootstrap UCL 4.304 95% Bootstrap t UCL 4.685											
85	95% H-UCL (Log ROS) 6.453											
86	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
87	KM Mean (logged) 0.756 95% H-UCL (KM -Log) 7.623											
88	KM SD (logged) 0.98 95% Critical H Value (KM-Log) 2.813											
89	KM Standard Error of Mean (logged) 0.295											
90	KM Standard Error of Mean (logged) 0.295											
91	DL/2 Statistics											
92	DL/2 Statistics											
93	DL/2 Normal DL/2 Log-Transformed											
94	Mean in Original Scale 3.092 Mean in Log Scale 0.877											
95	SD in Original Scale 2.193 SD in Log Scale 0.825											
96	95% t UCL (Assumes normality) 4.177 95% H-Stat UCL 6.209											
97	DL/2 is not a recommended method, provided for comparisons and historical reasons											
98	DL/2 is not a recommended method, provided for comparisons and historical reasons											
99	Nonparametric Distribution Free UCL Statistics											
100	Detected Data appear Normal Distributed at 5% Significance Level											
101	Detected Data appear Normal Distributed at 5% Significance Level											
102	Suggested UCL to Use											
103	95% KM (t) UCL 4.18 95% KM (Percentile Bootstrap) UCL 4.137											
104	95% KM (t) UCL 4.18 95% KM (Percentile Bootstrap) UCL 4.137											
105	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
106	Recommendations are based upon data size, data distribution, and skewness.											
107	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
108	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
111												
112						General Statistics						
113			Total Number of Observations			13				Number of Distinct Observations		11
114			Number of Detects			11				Number of Non-Detects		2
115			Number of Distinct Detects			10				Number of Distinct Non-Detects		2
116			Minimum Detect			0.8				Minimum Non-Detect		3
117			Maximum Detect			8				Maximum Non-Detect		5
118			Variance Detects			5.795				Percent Non-Detects		15.38%
119			Mean Detects			5.564				SD Detects		2.407
120			Median Detects			5.6				CV Detects		0.433
121			Skewness Detects			-0.916				Kurtosis Detects		0.0128
122			Mean of Logged Detects			1.558				SD of Logged Detects		0.707
123												
124						Normal GOF Test on Detects Only						
125			Shapiro Wilk Test Statistic			0.89				Shapiro Wilk GOF Test		
126			5% Shapiro Wilk Critical Value			0.85				Detected Data appear Normal at 5% Significance Level		
127			Lilliefors Test Statistic			0.179				Lilliefors GOF Test		
128			5% Lilliefors Critical Value			0.267				Detected Data appear Normal at 5% Significance Level		
129						Detected Data appear Normal at 5% Significance Level						
130						Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
131			Mean			4.988				Standard Error of Mean		0.756
132			SD			2.547				95% KM (BCA) UCL		6.215
133			95% KM (t) UCL			6.334				95% KM (Percentile Bootstrap) UCL		6.223
134			95% KM (z) UCL			6.231				95% KM Bootstrap t UCL		6.154
135			90% KM Chebyshev UCL			7.255				95% KM Chebyshev UCL		8.282
136			97.5% KM Chebyshev UCL			9.707				99% KM Chebyshev UCL		12.51
137												
138												
139						Gamma GOF Tests on Detected Observations Only						
140			A-D Test Statistic			0.89				Anderson-Darling GOF Test		
141			5% A-D Critical Value			0.733				Detected Data Not Gamma Distributed at 5% Significance Level		
142			K-S Test Statistic			0.23				Kolmogrov-Smirnoff GOF		
143			5% K-S Critical Value			0.257				Detected data appear Gamma Distributed at 5% Significance Level		
144						Detected data follow Appr. Gamma Distribution at 5% Significance Level						
145												
146						Gamma Statistics on Detected Data Only						
147			k hat (MLE)			3.31				k star (bias corrected MLE)		2.468
148			Theta hat (MLE)			1.681				Theta star (bias corrected MLE)		2.254
149			nu hat (MLE)			72.82				nu star (bias corrected)		54.29
150			MLE Mean (bias corrected)			5.564				MLE Sd (bias corrected)		3.542
151												
152						Gamma Kaplan-Meier (KM) Statistics						
153			k hat (KM)			3.835				nu hat (KM)		99.71
154			Approximate Chi Square Value (99.71, α)			77.67				Adjusted Chi Square Value (99.71, β)		74.91
155			95% Gamma Approximate KM-UCL (use when $n \geq 50$)			6.402				95% Gamma Adjusted KM-UCL (use when $n < 50$)		6.639
156												
157						Gamma ROS Statistics using Imputed Non-Detects						
158			GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs									
159			GROS may not be used when kstar of detected data is small such as < 0.1									
160			For such situations, GROS method tends to yield inflated values of UCLs and BTVs									
161			For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates									
162			Minimum			0.8				Mean		5.138
163			Maximum			8				Median		5.3

	A	B	C	D	E	F	G	H	I	J	K	L
221			5% Shapiro Wilk Critical Value			0.85		Detected Data appear Normal at 5% Significance Level				
222			Lilliefors Test Statistic			0.213		Lilliefors GOF Test				
223			5% Lilliefors Critical Value			0.267		Detected Data appear Normal at 5% Significance Level				
224			Detected Data appear Normal at 5% Significance Level									
225												
226			Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs									
227			Mean			3.432				Standard Error of Mean		0.711
228			SD			2.412				95% KM (BCA) UCL		4.789
229			95% KM (t) UCL			4.698				95% KM (Percentile Bootstrap) UCL		4.691
230			95% KM (z) UCL			4.601				95% KM Bootstrap t UCL		5.225
231			90% KM Chebyshev UCL			5.564				95% KM Chebyshev UCL		6.53
232			97.5% KM Chebyshev UCL			7.871				99% KM Chebyshev UCL		10.5
233												
234			Gamma GOF Tests on Detected Observations Only									
235			A-D Test Statistic			0.388		Anderson-Darling GOF Test				
236			5% A-D Critical Value			0.737		Detected data appear Gamma Distributed at 5% Significance Level				
237			K-S Test Statistic			0.167		Kolmogrov-Smirnoff GOF				
238			5% K-S Critical Value			0.258		Detected data appear Gamma Distributed at 5% Significance Level				
239			Detected data appear Gamma Distributed at 5% Significance Level									
240												
241			Gamma Statistics on Detected Data Only									
242			k hat (MLE)			2.326				k star (bias corrected MLE)		1.752
243			Theta hat (MLE)			1.626				Theta star (bias corrected MLE)		2.159
244			nu hat (MLE)			51.16				nu star (bias corrected)		38.54
245			MLE Mean (bias corrected)			3.782				MLE Sd (bias corrected)		2.857
246												
247			Gamma Kaplan-Meier (KM) Statistics									
248			k hat (KM)			2.024				nu hat (KM)		52.61
249			Approximate Chi Square Value (52.61, α)			36.95				Adjusted Chi Square Value (52.61, β)		35.09
250			95% Gamma Approximate KM-UCL (use when $n \geq 50$)			4.886				95% Gamma Adjusted KM-UCL (use when $n < 50$)		5.146
251												
252			Gamma ROS Statistics using Imputed Non-Detects									
253			GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs									
254			GROS may not be used when kstar of detected data is small such as < 0.1									
255			For such situations, GROS method tends to yield inflated values of UCLs and BTVs									
256			For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates									
257			Minimum			0.4				Mean		3.44
258			Maximum			9.9				Median		3
259			SD			2.464				CV		0.716
260			k hat (MLE)			1.977				k star (bias corrected MLE)		1.572
261			Theta hat (MLE)			1.74				Theta star (bias corrected MLE)		2.188
262			nu hat (MLE)			51.4				nu star (bias corrected)		40.87
263			MLE Mean (bias corrected)			3.44				MLE Sd (bias corrected)		2.743
264										Adjusted Level of Significance (β)		0.0301
265			Approximate Chi Square Value (40.87, α)			27.22				Adjusted Chi Square Value (40.87, β)		25.64
266			95% Gamma Approximate UCL (use when $n \geq 50$)			5.165				95% Gamma Adjusted UCL (use when $n < 50$)		5.483
267												
268			Lognormal GOF Test on Detected Observations Only									
269			Shapiro Wilk Test Statistic			0.872		Shapiro Wilk GOF Test				
270			5% Shapiro Wilk Critical Value			0.85		Detected Data appear Lognormal at 5% Significance Level				
271			Lilliefors Test Statistic			0.216		Lilliefors GOF Test				
272			5% Lilliefors Critical Value			0.267		Detected Data appear Lognormal at 5% Significance Level				
273			Detected Data appear Lognormal at 5% Significance Level									

	A	B	C	D	E	F	G	H	I	J	K	L
276				Mean in Original Scale		3.433				Mean in Log Scale		0.976
277				SD in Original Scale		2.455				SD in Log Scale		0.824
278				95% t UCL (assumes normality of ROS data)		4.647				95% Percentile Bootstrap UCL		4.579
279				95% BCA Bootstrap UCL		4.818				95% Bootstrap t UCL		5.265
280				95% H-UCL (Log ROS)		6.842						
281				UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed								
282				KM Mean (logged)		0.915				95% H-UCL (KM -Log)		7.836
283				KM SD (logged)		0.92				95% Critical H Value (KM-Log)		2.712
284				KM Standard Error of Mean (logged)		0.277						
285				DL/2 Statistics								
286				DL/2 Normal				DL/2 Log-Transformed				
287				Mean in Original Scale		3.469				Mean in Log Scale		1.001
288				SD in Original Scale		2.428				SD in Log Scale		0.798
289				95% t UCL (Assumes normality)		4.669				95% H-Stat UCL		6.679
290				DL/2 is not a recommended method, provided for comparisons and historical reasons								
291				Nonparametric Distribution Free UCL Statistics								
292				Detected Data appear Normal Distributed at 5% Significance Level								
293				Suggested UCL to Use								
294				95% KM (t) UCL		4.698				95% KM (Percentile Bootstrap) UCL		4.691
295				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
296				Recommendations are based upon data size, data distribution, and skewness.								
297				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
298				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
299												
300												
301												
302												
303												
304												
305												
306	TCE											
307												
308				General Statistics								
309				Total Number of Observations		13				Number of Distinct Observations		13
310										Number of Missing Observations		0
311				Minimum		5.6				Mean		32.66
312				Maximum		74				Median		30
313				SD		21.43				Std. Error of Mean		5.944
314				Coefficient of Variation		0.656				Skewness		0.57
315				Normal GOF Test								
316				Shapiro Wilk Test Statistic		0.943				Shapiro Wilk GOF Test		
317				5% Shapiro Wilk Critical Value		0.866				Data appear Normal at 5% Significance Level		
318				Lilliefors Test Statistic		0.135				Lilliefors GOF Test		
319				5% Lilliefors Critical Value		0.246				Data appear Normal at 5% Significance Level		
320				Data appear Normal at 5% Significance Level								
321												
322				Assuming Normal Distribution								
323				95% Normal UCL						95% UCLs (Adjusted for Skewness)		
324				95% Student's-t UCL		43.26				95% Adjusted-CLT UCL (Chen-1995)		43.44
325										95% Modified-t UCL (Johnson-1978)		43.41
326												
327				Gamma GOF Test								
328												

	A	B	C	D	E	F	G	H	I	J	K	L
331				K-S Test Statistic		0.104						Kolmogrov-Smirnoff Gamma GOF Test
332				5% K-S Critical Value		0.239						Detected data appear Gamma Distributed at 5% Significance Level
333				Detected data appear Gamma Distributed at 5% Significance Level								
334												
33				Gamma Statistics								
336				k hat (MLE)		2.066					k star (bias corrected MLE)	1.641
337				Theta hat (MLE)		15.81					Theta star (bias corrected MLE)	19.91
338				nu hat (MLE)		53.73					nu star (bias corrected)	42.66
339				MLE Mean (bias corrected)		32.66					MLE Sd (bias corrected)	25.5
340											Approximate Chi Square Value (0.05)	28.69
341				Adjusted Level of Significance		0.0301					Adjusted Chi Square Value	27.06
342												
343				Assuming Gamma Distribution								
344				95% Approximate Gamma UCL (use when n>=50))		48.57					95% Adjusted Gamma UCL (use when n<50)	51.49
345												
346				Lognormal GOF Test								
347				Shapiro Wilk Test Statistic		0.922					Shapiro Wilk Lognormal GOF Test	
348				5% Shapiro Wilk Critical Value		0.866					Data appear Lognormal at 5% Significance Level	
349				Lilliefors Test Statistic		0.149					Lilliefors Lognormal GOF Test	
350				5% Lilliefors Critical Value		0.246					Data appear Lognormal at 5% Significance Level	
351				Data appear Lognormal at 5% Significance Level								
352												
353				Lognormal Statistics								
354				Minimum of Logged Data		1.723					Mean of logged Data	3.225
355				Maximum of Logged Data		4.304					SD of logged Data	0.83
356												
357				Assuming Lognormal Distribution								
358				95% H-UCL		65.66					90% Chebyshev (MVUE) UCL	59.48
359				95% Chebyshev (MVUE) UCL		70.87					97.5% Chebyshev (MVUE) UCL	86.67
360				99% Chebyshev (MVUE) UCL		117.7						
361												
362				Nonparametric Distribution Free UCL Statistics								
363				Data appear to follow a Discernible Distribution at 5% Significance Level								
364												
365				Nonparametric Distribution Free UCLs								
366				95% CLT UCL		42.44					95% Jackknife UCL	43.26
367				95% Standard Bootstrap UCL		42.1					95% Bootstrap-t UCL	45.3
368				95% Hall's Bootstrap UCL		43.93					95% Percentile Bootstrap UCL	42.31
369				95% BCA Bootstrap UCL		43.31						
370				90% Chebyshev(Mean, Sd) UCL		50.49					95% Chebyshev(Mean, Sd) UCL	58.57
371				97.5% Chebyshev(Mean, Sd) UCL		69.78					99% Chebyshev(Mean, Sd) UCL	91.81
372												
373				Suggested UCL to Use								
374				95% Student's-t UCL		43.26						
375												
376				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
377				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
378				and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.								
379				For additional insight the user may want to consult a statistician.								
380												
381												
382				cis-1,2-DCE								
383												

	A	B	C	D	E	F	G	H	I	J	K	L
386									Number of Missing Observations			0
387					Minimum	3					Mean	35.84
388					Maximum	140					Median	24
389					SD	34.89					Std. Error of Mean	9.676
390					Coefficient of Variation	0.973					Skewness	2.493
391												
392						Normal GOF Test						
393					Shapiro Wilk Test Statistic	0.723			Shapiro Wilk GOF Test			
394					5% Shapiro Wilk Critical Value	0.866			Data Not Normal at 5% Significance Level			
395					Lilliefors Test Statistic	0.232			Lilliefors GOF Test			
396					5% Lilliefors Critical Value	0.246			Data appear Normal at 5% Significance Level			
397					Data appear Approximate Normal at 5% Significance Level							
398												
399					Assuming Normal Distribution							
400					95% Normal UCL				95% UCLs (Adjusted for Skewness)			
401					95% Student's-t UCL	53.08			95% Adjusted-CLT UCL (Chen-1995)		58.9	
402									95% Modified-t UCL (Johnson-1978)		54.2	
403												
404					Gamma GOF Test							
405					A-D Test Statistic	0.381			Anderson-Darling Gamma GOF Test			
406					5% A-D Critical Value	0.749			Detected data appear Gamma Distributed at 5% Significance Level			
407					K-S Test Statistic	0.141			Kolmogrov-Smirnoff Gamma GOF Test			
408					5% K-S Critical Value	0.241			Detected data appear Gamma Distributed at 5% Significance Level			
409					Detected data appear Gamma Distributed at 5% Significance Level							
410												
411					Gamma Statistics							
412					k hat (MLE)	1.562			k star (bias corrected MLE)		1.253	
413					Theta hat (MLE)	22.95			Theta star (bias corrected MLE)		28.61	
414					nu hat (MLE)	40.6			nu star (bias corrected)		32.57	
415					MLE Mean (bias corrected)	35.84			MLE Sd (bias corrected)		32.02	
416									Approximate Chi Square Value (0.05)		20.52	
417					Adjusted Level of Significance	0.0301			Adjusted Chi Square Value		19.17	
418												
419					Assuming Gamma Distribution							
420					95% Approximate Gamma UCL (use when n>=50))		56.87		95% Adjusted Gamma UCL (use when n<50)		60.89	
421												
422					Lognormal GOF Test							
423					Shapiro Wilk Test Statistic	0.95			Shapiro Wilk Lognormal GOF Test			
424					5% Shapiro Wilk Critical Value	0.866			Data appear Lognormal at 5% Significance Level			
425					Lilliefors Test Statistic	0.181			Lilliefors Lognormal GOF Test			
426					5% Lilliefors Critical Value	0.246			Data appear Lognormal at 5% Significance Level			
427					Data appear Lognormal at 5% Significance Level							
428												
429					Lognormal Statistics							
430					Minimum of Logged Data	1.099			Mean of logged Data		3.226	
431					Maximum of Logged Data	4.942			SD of logged Data		0.919	
432												
433					Assuming Lognormal Distribution							
434					95% H-UCL	78.74			90% Chebyshev (MVUE) UCL		66.86	
435					95% Chebyshev (MVUE) UCL	80.48			97.5% Chebyshev (MVUE) UCL		99.39	
436					99% Chebyshev (MVUE) UCL	136.5						
437												
438					Nonparametric Distribution Free UCL Statistics							

	A	B	C	D	E	F	G	H	I	J	K	L
441	Nonparametric Distribution Free UCLs											
442					95% CLT UCL	51.75					95% Jackknife UCL	53.08
443					95% Standard Bootstrap UCL	51.44					95% Bootstrap-t UCL	69.94
444					95% Hall's Bootstrap UCL	122.1					95% Percentile Bootstrap UCL	52.38
44					95% BCA Bootstrap UCL	61.38						
446					90% Chebyshev(Mean, Sd) UCL	64.87					95% Chebyshev(Mean, Sd) UCL	78.01
447					97.5% Chebyshev(Mean, Sd) UCL	96.26					99% Chebyshev(Mean, Sd) UCL	132.1
448												
449	Suggested UCL to Use											
450					95% Student's-t UCL	53.08						
451												
452	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
453	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
454	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
455	For additional insight the user may want to consult a statistician.											
456												
457	1,4-Dioxane											
458												
459	General Statistics											
460					Total Number of Observations	13					Number of Distinct Observations	10
461					Number of Detects	11					Number of Non-Detects	2
462					Number of Distinct Detects	10					Number of Distinct Non-Detects	1
463					Minimum Detect	1					Minimum Non-Detect	1
464					Maximum Detect	3.7					Maximum Non-Detect	1
465					Variance Detects	0.605					Percent Non-Detects	15.38%
466					Mean Detects	2.091					SD Detects	0.778
467					Median Detects	2					CV Detects	0.372
468					Skewness Detects	0.822					Kurtosis Detects	0.55
469					Mean of Logged Detects	0.676					SD of Logged Detects	0.371
470												
471	Normal GOF Test on Detects Only											
472					Shapiro Wilk Test Statistic	0.943					Shapiro Wilk GOF Test	
473					5% Shapiro Wilk Critical Value	0.85					Detected Data appear Normal at 5% Significance Level	
474					Lilliefors Test Statistic	0.223					Lilliefors GOF Test	
475					5% Lilliefors Critical Value	0.267					Detected Data appear Normal at 5% Significance Level	
476	Detected Data appear Normal at 5% Significance Level											
477												
478	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
479					Mean	1.923					Standard Error of Mean	0.229
480					SD	0.788					95% KM (BCA) UCL	2.315
481					95% KM (t) UCL	2.331					95% KM (Percentile Bootstrap) UCL	2.285
482					95% KM (z) UCL	2.3					95% KM Bootstrap t UCL	2.451
483					90% KM Chebyshev UCL	2.61					95% KM Chebyshev UCL	2.922
484					97.5% KM Chebyshev UCL	3.354					99% KM Chebyshev UCL	4.202
485												
486	Gamma GOF Tests on Detected Observations Only											
487					A-D Test Statistic	0.218					Anderson-Darling GOF Test	
488					5% A-D Critical Value	0.73					Detected data appear Gamma Distributed at 5% Significance Level	
489					K-S Test Statistic	0.176					Kolmogrov-Smirnov GOF	
490					5% K-S Critical Value	0.256					Detected data appear Gamma Distributed at 5% Significance Level	
491	Detected data appear Gamma Distributed at 5% Significance Level											
492												
493	Gamma Statistics on Detected Data Only											

	A	B	C	D	E	F	G	H	I	J	K	L
496					nu hat (MLE)	181.4				nu star (bias corrected)		133.3
497					MLE Mean (bias corrected)	2.091				MLE Sd (bias corrected)		0.849
498					Gamma Kaplan-Meier (KM) Statistics							
499												
500					k hat (KM)	5.963				nu hat (KM)		155
501					Approximate Chi Square Value (155.03, α)	127.2				Adjusted Chi Square Value (155.03, β)		123.7
502					95% Gamma Approximate KM-UCL (use when $n \geq 50$)	2.343				95% Gamma Adjusted KM-UCL (use when $n < 50$)		2.411
503					Gamma ROS Statistics using Imputed Non-Detects							
504					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
505					GROS may not be used when kstar of detected data is small such as < 0.1							
506					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
507					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
508					Minimum	0.427				Mean		1.854
509					Maximum	3.7				Median		1.9
510					SD	0.917				CV		0.494
511					k hat (MLE)	3.707				k star (bias corrected MLE)		2.903
512					Theta hat (MLE)	0.5				Theta star (bias corrected MLE)		0.639
513					nu hat (MLE)	96.38				nu star (bias corrected)		75.47
514					MLE Mean (bias corrected)	1.854				MLE Sd (bias corrected)		1.088
515										Adjusted Level of Significance (β)		0.0301
516					Approximate Chi Square Value (75.47, α)	56.46				Adjusted Chi Square Value (75.47, β)		54.13
517					95% Gamma Approximate UCL (use when $n \geq 50$)	2.479				95% Gamma Adjusted UCL (use when $n < 50$)		2.586
518					Lognormal GOF Test on Detected Observations Only							
519												
520					Shapiro Wilk Test Statistic	0.981				Shapiro Wilk GOF Test		
521					5% Shapiro Wilk Critical Value	0.85				Detected Data appear Lognormal at 5% Significance Level		
522					Lilliefors Test Statistic	0.156				Lilliefors GOF Test		
523					5% Lilliefors Critical Value	0.267				Detected Data appear Lognormal at 5% Significance Level		
524					Detected Data appear Lognormal at 5% Significance Level							
525					Lognormal ROS Statistics Using Imputed Non-Detects							
526												
527					Mean in Original Scale	1.894				Mean in Log Scale		0.539
528					SD in Original Scale	0.857				SD in Log Scale		0.476
529					95% t UCL (assumes normality of ROS data)	2.318				95% Percentile Bootstrap UCL		2.294
530					95% BCA Bootstrap UCL	2.292				95% Bootstrap t UCL		2.389
531					95% H-UCL (Log ROS)	2.559						
532					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
533												
534					KM Mean (logged)	0.572				95% H-UCL (KM -Log)		2.436
535					KM SD (logged)	0.407				95% Critical H Value (KM-Log)		2.01
536					KM Standard Error of Mean (logged)	0.118						
537					DL/2 Statistics							
538												
539					DL/2 Normal					DL/2 Log-Transformed		
540												
541					Mean in Original Scale	1.846				Mean in Log Scale		0.465
542					SD in Original Scale	0.928				SD in Log Scale		0.616
543					95% t UCL (Assumes normality)	2.305				95% H-Stat UCL		2.873
544					DL/2 is not a recommended method, provided for comparisons and historical reasons							
545					Nonparametric Distribution Free UCL Statistics							
546					Detected Data appear Normal Distributed at 5% Significance Level							
547												
548												

	A	B	C	D	E	F	G	H	I	J	K	L				
1	UCL Statistics for Data Sets with Non-Detects															
2																
3	User Selected Options															
4	Date/Time of Computation		6/13/2014 11:03:13 AM													
5	From File		Ametek_ProUCL_Input_ES with Dates_a.xls													
6	Full Precision		OFF													
7	Confidence Coefficient		95%													
8	Number of Bootstrap Operations		2000													
9																
10	1,1-DCE															
11																
12	General Statistics															
13	Total Number of Observations				12				Number of Distinct Observations				8			
14									Number of Missing Observations				1			
15	Number of Detects				10				Number of Non-Detects				2			
16	Number of Distinct Detects				8				Number of Distinct Non-Detects				2			
17	Minimum Detect				0.3				Minimum Non-Detect				2			
18	Maximum Detect				5				Maximum Non-Detect				5			
19	Variance Detects				1.896				Percent Non-Detects				16.67%			
20	Mean Detects				2.77				SD Detects				1.377			
21	Median Detects				2.45				CV Detects				0.497			
22	Skewness Detects				-0.00337				Kurtosis Detects				-0.0651			
23	Mean of Logged Detects				0.829				SD of Logged Detects				0.791			
24																
25	Normal GOF Test on Detects Only															
26	Shapiro Wilk Test Statistic				0.948				Shapiro Wilk GOF Test							
27	5% Shapiro Wilk Critical Value				0.842				Detected Data appear Normal at 5% Significance Level							
28	Lilliefors Test Statistic				0.188				Lilliefors GOF Test							
29	5% Lilliefors Critical Value				0.28				Detected Data appear Normal at 5% Significance Level							
30	Detected Data appear Normal at 5% Significance Level															
31																
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs															
33	Mean				2.525				Standard Error of Mean				0.448			
34	SD				1.422				95% KM (BCA) UCL				3.367			
35	95% KM (t) UCL				3.33				95% KM (Percentile Bootstrap) UCL				3.286			
36	95% KM (z) UCL				3.262				95% KM Bootstrap t UCL				3.362			
37	90% KM Chebyshev UCL				3.869				95% KM Chebyshev UCL				4.478			
38	97.5% KM Chebyshev UCL				5.323				99% KM Chebyshev UCL				6.983			
39																
40	Gamma GOF Tests on Detected Observations Only															
41	A-D Test Statistic				0.608				Anderson-Darling GOF Test							
42	5% A-D Critical Value				0.733				Detected data appear Gamma Distributed at 5% Significance Level							
43	K-S Test Statistic				0.279				Kolmogrov-Smirnoff GOF							
44	5% K-S Critical Value				0.269				Detected Data Not Gamma Distributed at 5% Significance Level							
45	Detected data follow Appr. Gamma Distribution at 5% Significance Level															
46																
47	Gamma Statistics on Detected Data Only															
48	k hat (MLE)				2.783				k star (bias corrected MLE)				2.015			
49	Theta hat (MLE)				0.995				Theta star (bias corrected MLE)				1.375			
50	nu hat (MLE)				55.67				nu star (bias corrected)				40.3			
51	MLE Mean (bias corrected)				2.77				MLE Sd (bias corrected)				1.951			
52																
53	Gamma Kaplan-Meier (KM) Statistics															

	A	B	C	D	E	F	G	H	I	J	K	L	
56	95% Gamma Approximate KM-UCL (use when n>=50)					3.374	95% Gamma Adjusted KM-UCL (use when n<50)					3.53	
57													
58	Gamma ROS Statistics using Imputed Non-Detects												
59	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
60	GROS may not be used when kstar of detected data is small such as < 0.1												
61	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
62	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
63	Minimum					0.3	Mean					2.581	
64	Maximum					5	Median					2.312	
65	SD					1.345	CV					0.521	
66	k hat (MLE)					2.827	k star (bias corrected MLE)					2.176	
67	Theta hat (MLE)					0.913	Theta star (bias corrected MLE)					1.186	
68	nu hat (MLE)					67.86	nu star (bias corrected)					52.23	
69	MLE Mean (bias corrected)					2.581	MLE Sd (bias corrected)					1.75	
70	Adjusted Level of Significance (β)												0.029
71	Approximate Chi Square Value (52.23, α)					36.63	Adjusted Chi Square Value (52.23, β)					34.64	
72	95% Gamma Approximate UCL (use when n>=50)					3.68	95% Gamma Adjusted UCL (use when n<50)					3.891	
73													
74	Lognormal GOF Test on Detected Observations Only												
75	Shapiro Wilk Test Statistic					0.763	Shapiro Wilk GOF Test						
76	5% Shapiro Wilk Critical Value					0.842	Detected Data Not Lognormal at 5% Significance Level						
77	Lilliefors Test Statistic					0.332	Lilliefors GOF Test						
78	5% Lilliefors Critical Value					0.28	Detected Data Not Lognormal at 5% Significance Level						
79	Detected Data Not Lognormal at 5% Significance Level												
80													
81	Lognormal ROS Statistics Using Imputed Non-Detects												
82	Mean in Original Scale					2.522	Mean in Log Scale					0.713	
83	SD in Original Scale					1.395	SD in Log Scale					0.792	
84	95% t UCL (assumes normality of ROS data)					3.246	95% Percentile Bootstrap UCL					3.169	
85	95% BCA Bootstrap UCL					3.192	95% Bootstrap t UCL					3.308	
86	95% H-UCL (Log ROS)					5.14							
87													
88	DL/2 Statistics												
89	DL/2 Normal						DL/2 Log-Transformed						
90	Mean in Original Scale					2.6	Mean in Log Scale					0.767	
91	SD in Original Scale					1.346	SD in Log Scale					0.755	
92	95% t UCL (Assumes normality)					3.298	95% H-Stat UCL					5.058	
93	DL/2 is not a recommended method, provided for comparisons and historical reasons												
94													
95	Nonparametric Distribution Free UCL Statistics												
96	Detected Data appear Normal Distributed at 5% Significance Level												
97													
98	Suggested UCL to Use												
99	95% KM (t) UCL					3.33	95% KM (Percentile Bootstrap) UCL					3.286	
100													
101	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
102	Recommendations are based upon data size, data distribution, and skewness.												
103	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
104	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
105													
106	1,1,1-TCA												
107													
108	General Statistics												

	A	B	C	D	E	F	G	H	I	J	K	L
111				Number of Detects		10				Number of Non-Detects		2
112				Number of Distinct Detects		9				Number of Distinct Non-Detects		2
113				Minimum Detect		0.4				Minimum Non-Detect		2
114				Maximum Detect		6				Maximum Non-Detect		5
115				Variance Detects		2.385				Percent Non-Detects		16.67%
116				Mean Detects		3.17				SD Detects		1.544
117				Median Detects		3				CV Detects		0.487
118				Skewness Detects		0.165				Kurtosis Detects		0.77
119				Mean of Logged Detects		0.981				SD of Logged Detects		0.742
120				Normal GOF Test on Detects Only								
121				Normal GOF Test on Detects Only								
122				Shapiro Wilk Test Statistic		0.974				Shapiro Wilk GOF Test		
123				5% Shapiro Wilk Critical Value		0.842				Detected Data appear Normal at 5% Significance Level		
124				Lilliefors Test Statistic		0.166				Lilliefors GOF Test		
125				5% Lilliefors Critical Value		0.28				Detected Data appear Normal at 5% Significance Level		
126				Detected Data appear Normal at 5% Significance Level								
127				Detected Data appear Normal at 5% Significance Level								
128				Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs								
129				Mean		2.893				Standard Error of Mean		0.499
130				SD		1.59				95% KM (BCA) UCL		3.833
131				95% KM (t) UCL		3.789				95% KM (Percentile Bootstrap) UCL		3.717
132				95% KM (z) UCL		3.714				95% KM Bootstrap t UCL		3.751
133				90% KM Chebyshev UCL		4.39				95% KM Chebyshev UCL		5.069
134				97.5% KM Chebyshev UCL		6.01				99% KM Chebyshev UCL		7.86
135				Gamma GOF Tests on Detected Observations Only								
136				Gamma GOF Tests on Detected Observations Only								
137				A-D Test Statistic		0.513				Anderson-Darling GOF Test		
138				5% A-D Critical Value		0.732				Detected data appear Gamma Distributed at 5% Significance Level		
139				K-S Test Statistic		0.194				Kolmogrov-Smirnoff GOF		
140				5% K-S Critical Value		0.268				Detected data appear Gamma Distributed at 5% Significance Level		
141				Detected data appear Gamma Distributed at 5% Significance Level								
142				Detected data appear Gamma Distributed at 5% Significance Level								
143				Gamma Statistics on Detected Data Only								
144				k hat (MLE)		3.048				k star (bias corrected MLE)		2.2
145				Theta hat (MLE)		1.04				Theta star (bias corrected MLE)		1.441
146				nu hat (MLE)		60.96				nu star (bias corrected)		44
147				MLE Mean (bias corrected)		3.17				MLE Sd (bias corrected)		2.137
148				Gamma Kaplan-Meier (KM) Statistics								
149				Gamma Kaplan-Meier (KM) Statistics								
150				k hat (KM)		3.311				nu hat (KM)		79.47
151				Approximate Chi Square Value (79.47, α)		59.93				Adjusted Chi Square Value (79.47, β)		57.34
152				95% Gamma Approximate KM-UCL (use when $n \geq 50$)		3.836				95% Gamma Adjusted KM-UCL (use when $n < 50$)		4.008
153				Gamma ROS Statistics using Imputed Non-Detects								
154				Gamma ROS Statistics using Imputed Non-Detects								
155				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
156				GROS may not be used when kstar of detected data is small such as < 0.1								
157				For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
158				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
159				Minimum		0.4				Mean		2.951
160				Maximum		6				Median		2.85
161				SD		1.517				CV		0.514
162				k hat (MLE)		3.026				k star (bias corrected MLE)		2.325
163				Theta hat (MLE)		0.975				Theta star (bias corrected MLE)		1.269

	A	B	C	D	E	F	G	H	I	J	K	L	
166									Adjusted Level of Significance (β)			0.029	
167		Approximate Chi Square Value (55.79, α)				39.63			Adjusted Chi Square Value (55.79, β)			37.55	
168		95% Gamma Approximate UCL (use when $n \geq 50$)				4.155			95% Gamma Adjusted UCL (use when $n < 50$)			4.384	
169		Lognormal GOF Test on Detected Observations Only											
171		Shapiro Wilk Test Statistic				0.792			Shapiro Wilk GOF Test				
172		5% Shapiro Wilk Critical Value				0.842		Detected Data Not Lognormal at 5% Significance Level					
173		Lilliefors Test Statistic				0.249		Lilliefors GOF Test					
174		5% Lilliefors Critical Value				0.28		Detected Data appear Lognormal at 5% Significance Level					
175		Detected Data appear Approximate Lognormal at 5% Significance Level											
176		Lognormal ROS Statistics Using Imputed Non-Detects											
178		Mean in Original Scale				2.896			Mean in Log Scale				0.871
179		SD in Original Scale				1.562			SD in Log Scale				0.746
180		95% t UCL (assumes normality of ROS data)				3.706			95% Percentile Bootstrap UCL				3.616
181		95% BCA Bootstrap UCL				3.691			95% Bootstrap t UCL				3.762
182		95% H-UCL (Log ROS)				5.512							
183		UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
185		KM Mean (logged)				0.8			95% H-UCL (KM -Log)				6.487
186		KM SD (logged)				0.864			95% Critical H Value (KM-Log)				2.676
187		KM Standard Error of Mean (logged)				0.274							
188		DL/2 Statistics											
189		DL/2 Normal					DL/2 Log-Transformed						
191		Mean in Original Scale				2.933			Mean in Log Scale				0.894
192		SD in Original Scale				1.536			SD in Log Scale				0.728
193		95% t UCL (Assumes normality)				3.73			95% H-Stat UCL				5.462
194		DL/2 is not a recommended method, provided for comparisons and historical reasons											
195		Nonparametric Distribution Free UCL Statistics											
197		Detected Data appear Normal Distributed at 5% Significance Level											
198		Suggested UCL to Use											
200		95% KM (t) UCL				3.789			95% KM (Percentile Bootstrap) UCL				3.717
202		Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
203		Recommendations are based upon data size, data distribution, and skewness.											
204		These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
205		However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
208	cis-1,2-DCE												
210		General Statistics											
211		Total Number of Observations				12			Number of Distinct Observations				10
212								Number of Missing Observations				1	
213		Minimum				3			Mean				27.16
214		Maximum				61			Median				24
215		SD				16.1			Std. Error of Mean				4.648
216		Coefficient of Variation				0.593			Skewness				0.701
217		Normal GOF Test											
218													

	A	B	C	D	E	F	G	H	I	J	K	L
221				Lilliefors Test Statistic		0.171			Lilliefors GOF Test			
222				5% Lilliefors Critical Value		0.256			Data appear Normal at 5% Significance Level			
223				Data appear Normal at 5% Significance Level								
224												
225				Assuming Normal Distribution								
226				95% Normal UCL					95% UCLs (Adjusted for Skewness)			
227				95% Student's-t UCL		35.5			95% Adjusted-CLT UCL (Chen-1995)		35.81	
228									95% Modified-t UCL (Johnson-1978)		35.66	
229												
230				Gamma GOF Test								
231				A-D Test Statistic		0.268			Anderson-Darling Gamma GOF Test			
232				5% A-D Critical Value		0.74			Detected data appear Gamma Distributed at 5% Significance Level			
233				K-S Test Statistic		0.157			Kolmogrov-Smirnoff Gamma GOF Test			
234				5% K-S Critical Value		0.248			Detected data appear Gamma Distributed at 5% Significance Level			
235				Detected data appear Gamma Distributed at 5% Significance Level								
236												
237				Gamma Statistics								
238				k hat (MLE)		2.439			k star (bias corrected MLE)		1.885	
239				Theta hat (MLE)		11.14			Theta star (bias corrected MLE)		14.41	
240				nu hat (MLE)		58.53			nu star (bias corrected)		45.23	
241				MLE Mean (bias corrected)		27.16			MLE Sd (bias corrected)		19.78	
242									Approximate Chi Square Value (0.05)		30.81	
243				Adjusted Level of Significance		0.029			Adjusted Chi Square Value		29	
244												
245				Assuming Gamma Distribution								
246				95% Approximate Gamma UCL (use when n>=50))		39.88			95% Adjusted Gamma UCL (use when n<50)		42.36	
247												
248				Lognormal GOF Test								
249				Shapiro Wilk Test Statistic		0.892			Shapiro Wilk Lognormal GOF Test			
250				5% Shapiro Wilk Critical Value		0.859			Data appear Lognormal at 5% Significance Level			
251				Lilliefors Test Statistic		0.21			Lilliefors Lognormal GOF Test			
252				5% Lilliefors Critical Value		0.256			Data appear Lognormal at 5% Significance Level			
253				Data appear Lognormal at 5% Significance Level								
254												
255				Lognormal Statistics								
256				Minimum of Logged Data		1.099			Mean of logged Data		3.083	
257				Maximum of Logged Data		4.111			SD of logged Data		0.794	
258												
259				Assuming Lognormal Distribution								
260				95% H-UCL		55.2			90% Chebyshev (MVUE) UCL		49.88	
261				95% Chebyshev (MVUE) UCL		59.35			97.5% Chebyshev (MVUE) UCL		72.51	
262				99% Chebyshev (MVUE) UCL		98.35						
263												
264				Nonparametric Distribution Free UCL Statistics								
265				Data appear to follow a Discernible Distribution at 5% Significance Level								
266												
267				Nonparametric Distribution Free UCLs								
268				95% CLT UCL		34.8			95% Jackknife UCL		35.5	
269				95% Standard Bootstrap UCL		34.46			95% Bootstrap-t UCL		36.87	
270				95% Hall's Bootstrap UCL		38.49			95% Percentile Bootstrap UCL		34.41	
271				95% BCA Bootstrap UCL		35.17						
272				90% Chebyshev(Mean, Sd) UCL		41.1			95% Chebyshev(Mean, Sd) UCL		47.42	
273				97.5% Chebyshev(Mean, Sd) UCL		56.18			99% Chebyshev(Mean, Sd) UCL		73.4	

